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THE

TEACHING OF GEOGRAPHY

SUGGESTIONS
REGARDING PRINCIPLES AND METHODS
FOR THE USE OF TEACHERS

BY

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PREFACE

For some years past there has been a growing recognition of the extremely unsatisfactory position of Geography in the general educational system of this country. Various suggestions and efforts have been made to place the subject on a better footing. But reform in such matters is necessarily slow. Inveterate habits of use and wont are apt to blind us to the need for change, and any attempt to alter the existing system touches many different kinds of vested interests. Even those who sympathise with the proposals for reform raise their hands in despair, and ask where, amid the crowd of subjects now demanded, room is to be found for any new topic, or for any expansion of an old one. I fully recognise the gravity of these difficulties, and am by no means sanguine that they are all likely soon to be cleared away.

Nevertheless, so many influences are now at work, that we may look not unhopefully to the future. The persistent and well-directed efforts of the Royal Geographical Society to raise the standard of geographical education are already beginning to bear fruit, and certainly deserve the grateful recognition of all to whom the progress of education is dear.

The elevation of Geography to the place which it

ought to hold in the school curriculum in this country, as it does in Germany, appears to me to be a matter of vital moment, first, from the value of the subject as a branch of knowledge, and secondly, because it offers a cure for what I conceive to be a radical defect in our educational method, namely, the want of any effective discipline in habits of observation. While the memory is trained from infancy, and almost overburdened with the strain of school-work, the eye is left to train itself. I have long been convinced that an incalculable advantage would be gained, if something like the same care that is bestowed on taxing the powers of memory were given to the cultivation of accurate and rapid observation and inference. Geography, in the wide and true sense of the word, offers admirable scope for this kind of training. It may be begun on the very threshold of school-life, and may be pursued in ever-increasing fulness of detail and breadth of view up to the end of that time. No other subject can for a moment be compared with it in this respect. It serves as common ground on which the claims of literature, history, and science may be reconciled.

I may be told that I am striving after an unattainable ideal; but long reflection has convinced me that it is not unattainable, and that it is worthy of the most strenuous effort to reach it. The first step towards its realisation must be to present it frankly to the teachers, and enlist towards it their sympathy and co-operation. That there are excellent instructors in geography among us, who will find little or nothing new to them in the following pages, I readily admit. But they in turn will probably grant that teachers in

this country, through no fault of their own, but owing to our present defective system of instruction, can obtain no adequate training in methods of geographical teaching. There is good reason to hope that this defect may ere long be remedied. But in the meantime the teachers must train themselves.

The following chapters are meant merely as a series of hints and suggestions, with especial reference to principles and methods which, if followed, seem to me most likely to secure to Geography its proper place as an educational discipline. I have not attempted the ambitious task of writing a systematic treatise on the teaching of Geography. My object has rather been to indicate how, even among the youngest children and in every rank of life, an intelligent interest may be awakened and stimulated in the world around them; how they may be encouraged to look at things with their own eyes, and draw from them their own conclusions, and how in this way their conceptions of their immediate surroundings, of their country, and of the whole globe may, from the very outset, be made vivid, accurate, and enduring. Not without a deep sense of responsibility do I venture to bespeak the candid judgment of the teacher, in whose earnest desire for the furtherance of the cause of education I most cordially share.

HARROW ON THE HILL,
May 1887.

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CHAPTER I

INTRODUCTORY

GEOGRAPHY is commonly defined as a description of the earth. But it deals more specially with the earth as the dwelling-place of Man. It seeks to present a distinct and luminous picture of man's surroundings—the earth he walks upon, the air he breathes, the waters that fertilise his fields, the oceans that bear him from continent to continent, the living things that minister to his existence and enjoyment alike on land and sea. Every department of Nature has its own particular science, in which the minutest intricacies of structure and of process are patiently unravelled, and the facts are classified and arranged in their relations to each other and to the general system of the world. But Geography does not attempt such detailed investigation. It accepts from these various sciences the facts which they determine and the conclusions which they establish, but selects, in preference, those facts and conclusions which bear most closely upon the well-being of man, or which enable us most clearly to comprehend the general plan of the marvellous creation wherein we form a part. Thus, the aspects of the globe, as they present themselves to ordinary human intelligence, and the ever-changing phenomena that surround us and influence our daily life, are the peculiar domain of Geography.

Except the history and experience of man himself, there is no subject of inquiry that yields so profound and perennial a human interest as the story of the globe on which we dwell. We are surrounded with phenomena that

ceaselessly press themselves upon our notice. Our existence and enjoyment rest upon the continuance of the favourable conditions in which we live. As even a slight variation in these conditions may powerfully affect us for good or evil, they are a subject of momentous importance to us. We know that they differ greatly in different quarters of the globe, and we can hardly avoid some curiosity to learn on what circumstances such varying environment depends. It is the special function of Geography to direct our attention to these matters, to increase our knowledge of the country we live in, and thence to trace analogies and contrasts among the aspects of Nature in other regions of the globe. Geography compares the topography of one continent with that of another, dwelling upon the fundamental elements of each, and showing how they have affected the distribution and development of the human population. Mountains and valleys, hills and plains, rivers and lakes appear in region after region with ever the same essential features, but with endless diversity of local detail. Connecting this local detail with human history, Geography notes how largely it has influenced the progress of political events, how, for example, it has directed the migration of peoples, guided or arrested the tide of conquest, moulded national character, or given its own colouring to national mythology and literature. Geography further contrasts the climates of the globe, calls attention to the varying phases of plant and animal life by which they are accompanied, and traces their influence upon the march of discovery and the spread of civilisation and commerce.

In gathering the materials for this comprehensive picture of the earth as the dwelling-place of man, Geography culls freely from almost every branch of natural science. The facts and inferences which are in this way gathered from all corners of the globe demand for their adequate comprehension something more than mere book learning. The geographer should himself be an observer of Nature. He may know only a very limited space in the wide domains

of scientific acquirement; but his knowledge of that space should be thorough enough to enable him duly to appreciate habits of observation, methods of research, and processes of reasoning in other departments of inquiry. His sympathies should be wide and deep, embracing all parts of Nature, even those with which he has been able to make no personal acquaintance. This breadth of vision keeps him in touch with the progress of discovery. He is ever ready to detect the geographical significance of new observations, and to appropriate for his own subject the results obtained in the most widely-separated fields of scientific research.

What is true of the professed geographer holds also, in large measure, for those who teach geography. The teacher who would gain the greatest amount of personal enjoyment from the cultivation of this subject, and who would most successfully use it as a discipline in the education of others, should, as far as he can, make himself acquainted with the practical pursuit of at least one department of natural knowledge. The man who has once dissected a plant and practically studied the mutual relations and functions of its several parts, or who has himself traced the connection between the topography of a district and the nature of its underlying rocks, has acquired an experience which gives to his teaching of these subjects a precision and vividness that could never be gained from books. And in proportion as he cultivates the spirit and habit of personal observation and inquiry will his labours among the young be fruitful to them and satisfactory to himself. I do not, of course, mean to imply that good geographical instruction is impossible without scientific acquirement on the part of the instructor. But I would insist that as geography, though it may not claim to be itself a distinct science, is based upon the work of many sciences, its full value as an instrument of education cannot be obtained except by those who are imbued with the scientific spirit.

But Geography rests not only upon the facts and deductions of natural science. Its obligations are hardly less

extensive to the department of history. In many systems of education, indeed, it ranks merely as a branch of history. It is not content with tracing the present distribution of the races and nations of mankind. It seeks to picture older groupings out of which those of to-day have been developed, and to follow backward the successive stages of progress to the times of earliest history or tradition. All that may be gathered from written chronicle, or that may have been preserved in the names of places, or that may be inferred from the language and lineaments of a people, comes within the scope of the geographer's inquiry. And it is by availing himself of these manifold sources of information that he completes the political side of the picture which he draws of the geography of a country.

If this sketch of the scope and aim of Geography be accepted, it is evident that the study of the subject may be made a discipline of a high order in education. Instead of being a mere exercise of the memory, as it has so often been treated, geography steps at once into a foremost place among school subjects as an instrument for training various mental qualities that are hardly reached at all by the other branches of an ordinary curriculum. In the first place, and above all, it calls out into active exercise the observing faculty which is otherwise left wellnigh dormant in the ordinary tasks of school. It stimulates the reasoning powers, by teaching the value of the classification and co-ordination of facts and the methods of scientific induction. It affords ample exercise of the memory, but not in the mere mechanical way implied in the learning by rote of tables of figures and pages of statistics. It supplies invaluable information about innumerable familiar objects and aspects of Nature, and excites an interest in these that gives a new charm to every country walk. It furnishes a just conception of the fatherland in all its aspects, and passes thence to broad and intelligent views of the world at large. By thus widening the youthful experience of men and things it helps to stimulate habits of reflection and self-reliance, and strengthens the character for the future affairs of life.

To keep Geography on this high platform in the education of the country obviously requires a race of specially trained teachers. But there does not yet exist among us any provision for the acquisition of this special training. The teachers must in the meanwhile train themselves. In this self-imposed task their chief difficulty lies in the vastness of the field of inquiry, and the vagueness of its boundaries. They can hardly discover where to begin, or having begun, how to choose out of the overwhelming multiplicity of detail those parts which are really of service for geographical purposes. And even where they have made some progress in self-instruction the momentous problem still confronts them how to make the subject genuinely interesting and useful to their pupils.

Now it must be honestly admitted at the outset that there is no short cut or royal road to success in the teaching of Geography. No cramming or "getting up" the lesson can lead to any satisfactory result. The teacher must be content patiently and thoroughly to master his subject and to watch and measure the progress of his scholars by his own solid advancement. He should begin by divesting himself of the common notion that the teaching of geography can be taken up by anybody. When he has realised what geography in the true sense is, he will recognise that to make satisfactory use of it for purposes of instruction demands qualifications of no mean or ordinary kind. He will see that a wide range of reading is absolutely necessary to him, and that he must equip himself with such a store of illustrations gathered from all departments of knowledge as will enable him to elucidate each subject as it arises in the course of his tuition. He will perceive also how needful it is that he should himself possess such a practical acquaintance with his subject as mere reading will not give unless confirmed by observation and reflection. Thus furnished, he will find himself in large measure independent of class-books. Instead of contenting himself with hearing his pupils repeat a lesson which they have got by heart, he will make the lesson a text from which,

out of his own stores of knowledge, he will lighten up the subject till even the dullest boy can hardly fail to understand and take interest in it.

This is the ideal of geographical teaching at which, in my opinion, we should aim. And until some approach to it is reached I cannot believe that geography will take the place which it is entitled to hold in our educational system. Already there are among us not a few admirable teachers imbued with the true geographical spirit, but whose efforts are hampered by the use-and-wont bondage under which the teaching of geography has so long lain. Their number will doubtless steadily increase, for the day can hardly now be far distant when adequate provision will be made for the systematic training of teachers in the methods of geographical instruction.

In the meanwhile I offer these chapters, not as a formal treatise on the teaching of geography, but rather as a series of hints and suggestions with reference mainly to the elementary stage of the subject. These might be almost indefinitely extended and varied. But they will, I trust, suffice to make clear the spirit and method which, in my belief, ought to be maintained in this department of education. One distinguishing feature of this method is the wide scope which it affords for the manifestation of the individual character and special qualifications of the teacher himself. Another is the infinite variety which arises from differences in the local topography, natural history, historical associations, industries, and other circumstances of the environment. But amid all these diversities the same principles of treatment may be followed and the same ultimate educational results may be obtained. How this end is to be gained will, I hope, be gathered from the following pages.

CHAPTER II

GENERAL PRINCIPLES

In the teaching of geography, as in instruction of every kind, the fundamental condition for success is that the teacher has so thoroughly mastered the subject himself, and takes so much real interest in it, that he can speak to his pupils about it, not in the set phrases of a class-book, but out of the fulness of his own knowledge, being quick to draw his most effective illustrations from the daily experience of those to whom he addresses himself. If the aim of geography should be what is sketched in the foregoing chapter, it will be evident that a groundwork of preparation for the study of this branch of knowledge should be laid at an early age and in subjects that are not generally regarded as part of geography. The lessons may be begun almost with the very commencement of school-life. The attention of the children should be directed to what lies around them. The commonest facts of everyday experience supply endless material for profitable instruction, and the proper use of them furnishes a kind of mental discipline which is hardly otherwise obtainable.

In dealing with the young we should try to feel ourselves young again, to see things as they are seen by young eyes, to realise the difficulties that lie in the way of children's appreciation of the world around them, to be filled with an abounding sympathy which subdues all impatience on our side, and calls out on the side of the children their confidence and affection. Mutual sympathy and esteem are a pledge of enduring success. To cement this bond of union

between teacher and taught there should be no set tasks for some considerable time. The lessons ought rather to be pleasant conversations about familiar things. The pupils should be asked questions such as they can readily answer, and the answering of which causes them to reflect and gives them confidence in themselves and freedom with their teacher. The objects in the schoolroom, in the playground, on the road to school, should be made use of as subjects for such questionings, with the aim of drawing out the knowledge acquired by the pupils from their own observation. Every question should be one which requires for its answer that the children have actually seen something with their own eyes and have taken mental note of it. The putting of such questions stimulates the observing faculty, and not infrequently gives a chance of distinction to boys and girls whose capabilities are not well tested by the ordinary lessons of school. No teacher who has not tried this method of instruction can realise how much pleasure it gives to the pupils, and how greatly it tends to stimulate their mental progress. A fact discovered by the child for himself through his own direct observation becomes a part of his being, and is infinitely more to him than the same fact learnt from hearsay or acquired from a lesson-book. The idea of discovery should be encouraged in every way among children. We should remember that to them the whole of Nature is an unknown world into which their young souls, timidly or adventurously as may be, must advance. If we can help them to push forward boldly and see things for themselves we do them an inestimable service, not only adding to the joy of their childhood but kindling for them a light that will illumine all their future life. I hope to be able to show that this principle of discovery may be carried into departments of geographical teaching which might be supposed to offer but little scope for its exercise.

To begin the teaching of geography with formal lessons on the shape of the earth, parallels, meridians, equator, poles, and the rest, is to start at the wrong end. To the

average boy or girl of six or seven years these details have no meaning and no interest. Their introduction on the very threshold of geographical instruction is a characteristic feature of our system or rather want of system in this department of education. They are very generally placed at the beginning of our class-books, and being there they form, as a matter of course, the subjects of the first lessons usually given in geography. An altogether inordinate value is set by us upon class-books. Instead of serving as they ought, merely to furnish the text for the fuller and more interesting exposition of the teacher, these books are for the most part slavishly followed. The lesson of the day too often consists in the repetition by rote of so many sentences or paragraphs from the class-book, which are seldom expanded or made more attractive and intelligible by elucidation on the part of the teacher. Such instruction, if it may be so called, is bad for the teacher and worse for the taught. It is especially pernicious to the children in the earlier stages of their geographical studies, for it tortures their memories and brings no compensating advantage. It fosters idleness and listlessness on the part of the teacher, who instead of exerting his faculties to invest the subject with a living interest becomes for the time a mere machine, mechanically acting within the limits prescribed in the class-book.

This kind of teaching only by rote ought to be strenuously abolished. What is imperatively needed is that geography should become a thoroughly effective and valuable educational discipline. For this end, children should, as early as possible, be taught to use their own eyes in observing what lies around them, and their own judgment in drawing conclusions from what they see. Only after they have made some progress in this direction should they be called upon to begin the formal lessons of class-books. And as far as possible the facts stated in the class-books should be verified or illustrated by others that lie within the personal experience of the pupils. To read Nature only through what Dryden called "the spectacles of books"

is a hurtful habit, which is only too apt to weaken our mental vision and to prevent us from seeing clearly and intelligently what passes before our eyes. To enforce this habit upon the young by making them gather their ideas of geography from the sentences of a class-book rather than from the face of Nature is a serious injury to them.

I would therefore advocate that all the preliminary notions of geography should be acquired without the use of any class-book by the young pupils. These elementary conceptions can be gained more intelligently and thoroughly by a system of oral instruction, in which actual observation by the pupil plays a main part. The subjects of the earliest lessons should be taken from the familiar things of every-day experience. Remote though these may at first seem from the limits of what is commonly recognised as geography, they may be made to train the eye and the mind, so as to prepare the way for thoroughly satisfactory progress in geographical acquirement. It is obvious that an intelligent acquaintance with what immediately surrounds us ought to underlie any knowledge of things and places at a distance from us. The study of geography ought to begin at home, and from a basis of actual personal experience should advance to the consideration of other countries and of the earth as a whole.

But while laying his foundations broadly in this way, and widening the knowledge of his pupils, the teacher will do well to keep clearly before him some definite goal towards which the discipline of the elementary stage is to lead up. Probably no object can be suggested more fitting for this purpose than the thorough comprehension of a map. The power of understanding a map and getting from it all the information it can afford, is an acquisition which lies at the base of all sound geographical progress. Yet how large a proportion, even of the educated part of the community, have only a limited and imperfect conception of the full meaning and uses of a map. It should be, in my opinion, the teacher's main aim in the first or elementary stage of instruction to make the understanding of a map,

and the capability of adequately using it, the great end to be kept in view, and no pupil who has not mastered this acquirement should be allowed to pass into a higher grade. How this task may be attempted I shall try to sketch in succeeding chapters.

There is happily now a growing recognition of the principle that adequate geographical conceptions are best gained by observations made at the home locality. The school and its surroundings form the natural basis from which all subsequent geographical acquirement proceeds. Upon a groundwork of actual observation and measurement the young mind is led forward in a firm and steady progress. The schoolroom and playground serve as units from which an estimate is gradually formed of the relative proportions of more distant objects and places.

Such elementary notions as those of relative size and distance can be effectively taught and impressed upon the imagination and the memory by causing the pupils to make actual measurements, which may be done at first by pacing, and afterwards with a yard-measure or tape-line. The dimensions of the class-room being ascertained, they may then be compared with those of the school buildings and next with the playground, and by degrees a just conception of the proportions between the home locality and the rest of the country is built up. One of the collateral advantages of this practical method of learning the subject lies in the bodily exercise which it involves. A child likes to be actively doing something, and is delighted to exchange a lesson in spelling or arithmetic for a measured march along the schoolroom floor or across the playground. It is easy to take care that while the amusement afforded by such exercises is not unsympathetically repressed, it shall not in any way interfere with the practical good to be derived from them.

In taking the school surroundings as the basis of instruction, the teacher will readily recognise that while the principle of his method remains the same, its details must necessarily vary according to the circumstances of the

locality. The two most obvious distinctions are those of town and country. In a town, illustrations of the political side of geography are most prominent; in the country, it is the physical side that especially invites attention. As the facts of physical geography are simpler and more obvious than those of political geography, they offer greater facilities for elementary instruction. Hence a country schoolmaster is placed in the best conditions for effective geographical teaching. The face of Nature lies uncovered before him and affords him endless illustrations of his subject. A teacher in a large city stands in a less favourable position. The original aspect of the ground is concealed under streets and houses, and he may have to go far afield for examples of some of the most familiar physical features. On the other hand, as regards the political aspect of geography his position gives him many peculiar advantages. But, sustained by a living interest in his subject, a teacher will discover much even in the most unpromising circumstances which may be turned to account in laying the foundation of a thorough geographical training, as I shall endeavour to illustrate in later pages.

Not only should no class-books be assigned to the pupils in the elementary stage. The lessons should be as informal as possible. Anything approaching to a style of lecturing should be carefully avoided. Instead of appearing to discourse himself, the teacher should aim at obtaining clear articulate expression of the knowledge and experience of the children. The more homely and conversational he can make himself, consistent with their retention of due respect for him, the more will he win their confidence, the greater will be his hold upon them, and the more readily will they understand and remember the subjects which he brings before them. He will do well in the early stage to make no attempt at being strictly systematic in his choice and treatment of the topics of the lessons. It is often of advantage to let the lesson be suggested by some incident of the day, or something that has arrested notice since the previous lesson. The attention of the children is thereby riveted

to the subject. They are ready to say all that they know about it, and eager to hear anything more which the teacher may tell them. New ideas communicated to them in this way take hold of their imagination and sink into their memory. A large amount of useful information may thus be given, while at the same time the young minds are being gradually prepared for entering upon the proper field of geographical instruction.

In all these lessons, the system of question and answer must be scrupulously followed. The teacher should so frame his questions as to draw out what the children have actually seen and thought out for themselves, and he should at once stop and call attention to any statement evidently based, not on personal observation or reflection, but on hearsay. If, for instance, a boy in the elementary stage were to describe coal as the remains of plants turned into stone, or to speak of air as a mixture of two gases, or to allude to the earth revolving round the sun, he should be immediately checked and allowed only to say on each of these subjects what he might himself have seen or thought. Considerable reflection and experience are needed so to frame the question as to avoid extracting mere secondhand knowledge. The great object of the master should be to make the scholars observe and reflect, and he can best attain this end by throwing himself into the mood of the young mind, and by asking nothing which would involve knowledge beyond the attainments of the pupils, until he has satisfied himself as to the limits of these attainments. He may then judiciously sum up what has been gained during the lesson from the united experience of the whole class, and supplement it by filling in some of the more notable gaps. But the additions thus made by him to the common stock of acquirement should never be too preponderating a feature in the earlier lessons, and should come as naturally suggested by what has been obtained from the class.

Of the method here recommended one or two illustrations may be given. A wet morning will profitably suggest

a lesson on rain. Of the younger children only the most elementary and obvious facts should be asked, such, for instance, as that rain is water; that it comes from the skies, that it descends in drops which unite into pools or trickle on the ground, that it sinks into the soil and flows away, that it wets, that it refreshes the grass and the flowers, that it comes on dull, cloudy days, rather than on sunny days; and so on until the juvenile experience has been exhausted. Then the teacher will put together into one connected narrative all that he has drawn from the class, together with such additional facts by way of connecting links, as he thinks their intelligence will easily follow. But afterwards, as the children gain knowledge, he may return to the subject, and suggest observations and reflections arising out of the facts already gathered, for instance, that wet things dry again, and what becomes of the water they contained; that rain comes from the clouds, and how clouds are formed; that rain fills wells, springs, and rivers; and so by degrees to the general system of circulation of water over the surface of the earth. The replenishing of the schoolroom fire with coal will furnish materials for another lesson of a more advanced kind. First, all that the children may be expected to know from their own observation or reflection is extracted by question and answer, and then the teacher proceeds to tell about the nature and origin of coal, and the work of coal-miners. The flitting of a butterfly through the open window of the schoolroom will suggest a lesson on insect life, and give the teacher an opportunity of unfolding some of the wonders of the animal world and enforcing a reverence and sympathy for all living things. In short, his eye should be ever on the watch for materials on which he can train the observing and reflecting faculties of his scholars. If an incident likely to be of this useful kind should occur even in the midst of a lesson on another subject, he may profitably interrupt the work to direct attention to it that it may be distinctly seen, and he can afterwards at the proper time return to the elucidation of it.

Lessons after this method ought to be removed as far as possible from any look of task-work. They should be bright, lively, and genuinely interesting even to the dullest boy or girl. By avoiding anything in the nature of a task to be committed to memory at home, and by making the pupils themselves in great measure the sources of the information elicited by the questioning, the master keeps up the attention of the class from beginning to end. The geography lesson thus comes to be longed for as the most enjoyable of all in the routine of school-life. And its effects are soon appreciable, not only in school, but at home and by the wayside. As the questionings of the teacher embrace all the familiar objects of everyday life, the eyes of the pupils are quickened to take notice of what would otherwise have escaped them. A new interest is given to their surroundings; they are encouraged to reflect and to trace the connection between the facts which come under their observation. And thus their judgment is strengthened, while their powers of perception are developed.

A child does not at first perceive the relations of things to each other, and no attempt should be made for some time to point these out. It is enough to induce him to look at the things themselves, and be able to recognise them. He readily enough detects resemblances whether real or fanciful; he should be trained to notice differences. By degrees, as he gains familiarity with things, their connections will be gradually perceived by him, and may then be made the subject of fuller explanation. For example, the connection of the changes in the atmosphere with the influence of the sun upon the surface of our planet cannot be explained or understood until a large array of facts has been mastered. The formation of clouds, the fall of rain, the movements of the winds, may all, however, be observed and elucidated, and may be grasped by the pupils as facts before their marvellous connection and dependence upon solar radiation are touched upon. Deductions and principles to which the pupils have been in this way gradually led up through a series of observed facts are

apprehended with a vividness and joy attainable in no other way.

Whatever will contribute to the force of the mental impression made by the lessons may be usefully employed by the teacher. Objects of natural history are of the utmost service in this respect. Samples of raw and manufactured articles are likewise of great value. Diagrams, especially views of scenery and drawings of plants and animals, are indispensable as supplying pictorial representations of objects which cannot for the most part be seen by the pupils. Suppose, for instance, that a lesson has been suggested by the wooden benches of the schoolroom. All that the pupils can tell about the material should be drawn from them by judicious questioning—its origin from pine-trees, the form and scenery of these trees, the characters of the foliage and seed-cones and other facts which may be known. But it will often happen, as for example in large towns, that no specimens of coniferous trees are to be seen, and even in wooded districts it may not be possible to find samples of larch, spruce, or pine. In any case, a keen interest is taken in the exhibition of an actual branch of the tree itself with its spikey leaflets and attached cones, and the mental picture of the object is enlarged and illumined by the presentation of a diagram of a pine-forest with its huge gaunt trunks swinging their shaggy arms toward each other, while perhaps a bear or a reindeer is represented wandering among their shadows, or an eagle soars across the sky above them. Or should the lesson be taken from the dress of the scholars, a silk neck-tie will furnish to those of more advanced years a memorable lesson on the silk-worm and the silk industry. In illustration of such a lesson, a specimen or, failing that, a drawing of the moth is regarded with great interest by the young learners, and still more a sample of the cocoon and an explanation of the way in which the fibre is unwound and spun. The neck-tie may not thenceforth be more prized for decoration or warmth, but at all events it possesses a new kind of interest, and it has been the means of

opening a new chapter in the youthful experience of the world.

In many cases, teacher and pupils may collect the objects for illustrating the lessons. Where possible this ought on every occasion to be done, and the circumstances where the practice can be followed are more frequent than might be supposed. The teacher should from the first realise that some of the most valuable parts of the training his pupils can receive are not attainable within the walls of the class-room. Where practicable he should himself take walks with his pupils and direct their attention to the objects to be seen as they go. There are no doubt practical difficulties in the way of carrying out this method, but these are generally not insurmountable, as I shall endeavour to show in a later chapter. It is hardly possible to overrate the benefit that arises from this co-operation of teacher and taught in the open air. The restraints of the schoolroom are suspended without giving way to the licence of the playground; there is a freer and friendlier intercourse, not only between master and pupil, but among the pupils themselves. The most timid and the most forward are placed on the same footing, the retiring pupils of the ordinary class-work not infrequently coming well to the front by their quickness of perception and swiftness of inference. A teacher full of enthusiasm for Nature, and ready to share his love for it with his scholars, is sure to find his way to their hearts, to kindle in all of them a respect and in some of them a love for the objects of his own affection. He may not be in any sense a naturalist, and may not dream of making naturalists of his pupils. But by directing their eyes to the outer world and leading them to take reverent heed to what may there be seen, he fills their minds with a healthy influence, while at the same time he powerfully stimulates their powers of observation and deduction, and thus contributes in a most important degree towards their education.

Class excursions are of course most advantageously undertaken in the country, where indeed they ought always to form a prominent and essential part of the work of the

school. But they may also be profitably conducted in a large town—even in a wilderness of streets and houses, such as London, the skilful teacher will find topics of interest for every walk. Materials of construction, contrasted styles of architecture, the distribution and uses of public buildings, historical sites and associations, trades and industries—these and many other subjects will suggest themselves for delightful and profitable rambles through even the most crowded thoroughfares.

The chief danger in such class excursions is lest the pupils get out of the proper control of the master—a danger more especially liable to arise in towns. To guard against this risk, the number of pupils should never be so large as to be beyond ready and efficient restraint. At first it had better be rather smaller than the number which the teacher can easily manage. As he gains experience and confidence in his control and knowledge of the individual characters of the pupils he may increase the attendance. Much assistance may be derived from the employment of older scholars as monitors responsible for four or five of their juniors, and where this method of co-operation is available the number of excursionists may obviously be considerably extended.

When some progress has been made in elementary geographical conceptions, the blackboard should be brought into increasing use. After the schoolroom, for example, has been paced, and its dimensions and proportions have been thus ascertained, its plan should be drawn on the board by the teacher, with the relative positions of door, windows, and fireplace. From this beginning, gradual steps may be taken until the pupils can themselves draw on the board and on their slates rough plans of the school and of the playground. At first it will be sufficient to aim only at a general resemblance of proportion. The great object is to teach the young minds to realise the relations between the actual boundaries and the artificial representations of them. To succeed in this is by no means so easy as might be thought, but success in it is absolutely necessary and must be attained no matter at what expenditure of time

and labour. When it has been achieved efforts should next be made to depict the plan to scale, and with a nearer approach to correctness.

These lessons in plan-drawing lead up to the thorough comprehension of a map which, as I have said, ought to be the great goal to be kept in view for the elementary stage of geographical instruction. From the school and its playground, the drawings on the board may proceed to take in some of the school surroundings—the roads by which the children come from different quarters to school, with some of the more prominent objects by the wayside. Plans on different scales should be drawn and repeated in many different ways until the idea of relative proportions has been completely understood. Of course detailed accuracy of surveying is not to be aimed at. This should be reserved for an advanced stage when actual measurements and angles may be taken. Neatness of execution, however, should be insisted upon from an early stage in plan-drawing.

What I have said in this chapter refers mainly to the more elementary part of geographical teaching, and I would conclude this introductory chapter by insisting on the need for constant repetition and revision. It is hardly possible to overrate the importance of continuing this practice until the fundamental conceptions in geography are thoroughly mastered. We are too apt to be anxious to show progress and to push the pupils on at a faster rate than they can move. We are tempted to assume a knowledge which they do not possess, and to take for granted that what we have laboured to reduce to its simplest expression has been actually assimilated by them. There is no better way of testing and ensuring progress than by constant repetition. The teacher, however, may make the revision full of interest by letting light from all sides play round the facts already brought to notice until they are entirely grasped. New aspects and presentations of the old facts give them fresh value and help to fix them more firmly in the memory.

CHAPTER III

GENERAL PRINCIPLES—*continued*

WHEN the elementary stage has been passed, class-books may be introduced. At present, however, it is hardly possible to find in English any geographical class-books that meet all the needs of the case. Where a teacher is thoroughly equipped for his task, the class-book he requires is one that presents merely a general outline of the subject, more especially taking up those parts which cannot be learned directly from a map. With this summary in the hands of his pupils as a guide to them in their advance, he fills in the details partly from his own knowledge and partly by an exhaustive use of the map. But teachers possessing these qualifications are rare at present, and there is practically no existing organisation for training them. The ordinary instructor in geography has no special knowledge of the subject. Indeed, in a vast number of cases, he knows little or nothing more of it than is contained in the class-book. If then the book itself is a mere summary which the teacher never tries to expand and illustrate, the knowledge acquired by his class is of the most meagre kind, and its acquisition being chiefly by an act of memory, it makes little permanent lodgment in the mind, passing away by degrees into forgetfulness and leaving no enduring benefit behind. In such circumstances, what are called "Readers" are of service. They supply the want of knowledge on the part of the teacher, and they afford in a more or less attractive way information which the pupils are interested to learn. But on the other hand, they fail in that systematic

completeness and that conciseness and precision of detail which are essential for accurate geographical acquirement, and which can only be adequately learnt at school by the patient personal instruction of a qualified teacher, and the methodical use of maps and other instruments of teaching.

Among these educational appliances I place in the fore-front good wall-maps. These should be clear, bold, simple, and not too crowded with names. They should be made the foundation on which all the geographical knowledge of each country is built up in the minds of the scholars. Nothing can be more pernicious in education than to make a class of boys or girls learn by rote from the pages of a class-book, and without reference to the map, long lists of capes, bays, rivers, lakes, and mountains. I still remember with impatience the irksomeness and unprofitableness of such tasks in my own boyhood; the disgust with which the geography lesson was anticipated, the impotent and despairing questioning why such dreary, unconnected details should form part even of the drudgery of school. There was no map on the walls and no amplification or elucidation was offered to the poor pupils, who under dread of pains and penalties were expected not only to repeat the names correctly, but in the precise order of the lists in the class-book. Meaningless tasks of this kind have doubtless been one main cause of the degradation into which geographical teaching has sunk in this country. They are felt by the boy to have no interest or soul or usefulness about them, and this impression remains with him through life.

In regard to the physical features of a country, the map is the essential basis alike for the teacher in his lessons and for the pupils in their preparation. Instead of prescribing a list of names to be committed to memory from a class-book, he should ask the children to pick out the names from the map and to note their position there. One day, perhaps, the subject is part of the coast-line of a country. The limits of the tract to be described having been fixed, the attention of the scholars is requested to the features depicted on the map, and the relative forms and proportions of these.

The capes and bays and river mouths are traced out in due order. Each learner becomes as it were a geographical explorer, noting for himself the physical features of the area, and fixing them in his memory as they appear on the map. During the lesson, all the information obtainable from the map is first drawn from the class. In this process it will readily be seen how much more is got out of the map by some pupils than by others. But there may still remain features which have not been noticed by any of them, but to which their attention should be called. Thereafter the teacher may fill in details not represented upon the map, but which give interest and vividness to the subject. For instance, he may profitably describe the scenery at different points, as where a cape rises into a bold headland, or where a bay recedes with low, sandy shores. The relation of the form of the coast to harbours, fisheries, and other matters connected with human progress should be touched upon, and any interesting historical information may be added. The essential requisite is to awaken a genuine interest in the theme on the part of the pupils; to make them feel that they are not merely exercising their memory, but that they are called upon to cultivate their observation and judgment in gathering from the map all that it is fitted to yield to them.

The value and use of maps in education are not yet duly recognised in this country. Our school-maps are consequently not as effective, as varied, as numerous, and as cheap as they ought to be. But the supply is no doubt equal to the demand, and when our teachers require better and cheaper maps these will assuredly be forthcoming. In the next chapter I shall deal more in detail with this question. Let me only point out here that every subject which has a geographical aspect may be depicted upon a map, and when so represented can generally be far more readily apprehended and enduringly remembered than from mere verbal description. Hence the variety of maps which a teacher may profitably use is almost endless. Comparatively few of these are to be purchased; but he may him-

self make them. He should provide himself with a stock of blank maps which he can colour from time to time according to the subject of his tuition. He may thus by degrees amass a large series of invaluable maps for teaching,—physical, geological, political, historical, industrial, ethnological, zoological, botanical, etc.

Appeals to the eye are always of the highest importance in education, and more especially in such a subject as geography. Not only should constant and exhaustive use be made of maps, but the teacher should increase his appliances by a judicious selection of diagrams representing scenery, views of towns, and historical sites, different varieties of mankind, interesting or important plants and animals, or other objects referred to in the lessons. A picture of a date-palm, a lion, an Esquimaux, will at once convey to the mind an accurate impression of the object, which could not be imparted by the most laboured description. Photographs of scenery, cities, and buildings are now easily procurable. I have already referred to the importance of exhibiting objects of natural history, in order to give vividness to the lessons. Specimens of raw articles and of the stages of their manufacture up to the finished products are also exceedingly useful. In short, the teacher can hardly overdo the extent to which he stimulates the interest of his pupils in the work of the class-room, by presenting to their eyes actual visible illustrations of the subjects embraced in the lessons.

As the pupils advance in their acquirements, the teacher will do well to range freely into other departments of knowledge for illustrations that give greater breadth of vision, clearness of insight, or living interest in geographical pursuits. For example, he will weave more closely and in ampler detail the connection of geography and history. The names of mountains and rivers will supply him with many opportunities of referring to the earlier races that peopled a country. The names of towns and battlefields will furnish texts from which he can draw out and augment the knowledge of his pupils regarding the history of their own or of other countries. The birthplaces of great men

will open up glimpses into the life and doings of statesmen, warriors, poets, painters, men of science. Allusions to scenery will naturally call forth references to the literature in which the scenery is most picturesquely portrayed. Graphic epithets applied in poetry to the features of a landscape are well worthy of attention, such, for instance, as the many descriptive adjectives prefixed to rivers—"praeceps Anio," "flavus Tiberis," "fertile Nile," "slow Peneus," "royal-towered Thames," "swift Severn," "sedgy Lea," "chalky Kenet," "moorish Cole," "coaly Tyne," "storming Humber," "sacred Dee," "bonnie Doon." In short, as far as can possibly be done, no topographical name should be introduced into a lesson without some human association linked with it, historical, social, industrial, literary, or whatever it may be, which shall fix it in the memory, there to be bound up with other recollections.

It is evident that no class-book can adequately cover this field of allusion and reference. For the most part, the teacher's own reading must supply him with his materials, and the wider his range of general acquirement the ampler will be his power of exposition, and the more fruitful in every way will be his lessons. In a later chapter I propose to illustrate this part of the subject by some examples which will better enforce the method that is here so strongly recommended.

For the higher classes in geography the practice will be found of signal advantage to read as part of the school-work, books of travel or voyages of discovery. The readings should be made the occasion of critical digressions in which the teacher will call attention to the geographical data established, to observations since discovered to be erroneous, or since confirmed by subsequent explorers, to defective methods of inquiry, to the gradual elucidation of scientific problems, to the influence of the geographical discoveries upon political, social, and commercial progress. In such digressions, he will of course always begin by questioning his class in such a way as to draw out their knowledge and reflections, and to suggest the inference to which he means to

lead them. His object should still be to keep himself as far as he can in the background, and to reach the conclusions he aims at rather by the mental efforts of his pupils than by formal statements of his own.

Before the scholars leave school they should have had some practical experience of methods of surveying, and some of them at least should be able to delineate, with neatness and some near approach to accuracy, the topographical features of any district into which they may be sent. The practice of taking excursions, which begins with the early stages of instruction, should be continued to the end, but with ever-increasing minuteness of detail and augmentation of scope. During their walks the pupils may easily have acquired sufficient acquaintance with geology, botany, and zoology as to be able to recognise the minerals and rocks, plants and animals of the district in which they live. They should have learnt to connect the nature of the surface topography and soil with the rocks lying underneath; to know the special habitats of plants, shells, insects, birds; to observe meterological phenomena with the use of thermometer, barometer, rain-gauge, and anemometer. While gaining these acquirements in the geographical class, they may also have been making progress in other classes more specially scientific. Geology, botany, or zoology, for example, may have been more or less successfully taught to them. But no harm is done by this overlapping of instruction. The teacher of geography will find some of his labour lightened if his pupils are well grounded in one or more of the observational sciences; and he will always be able to put the facts and deductions of these sciences in a fresh light by showing their geographical relations.

Where the circumstances of the locality will permit, the work of the geography class may with great profit embrace a thorough geographical study of the district in which the school is situated. The results of all the excursions will then be gathered together, with the information that has been amassed in the class-room or in the reading of the pupils themselves. In this way, a connected picture of the

topography, history, geology, soils and agriculture, botany, zoology, population, industries, etc., may be drawn. By thus carrying out the lessons to their practical consummation, the pupils will be taught in the most thoroughly effective way the true meaning and value of geographical knowledge. They will be ready for such further progress in geographical education as the universities may eventually deign to afford; and even should no more systematic training fall to their lot, they will be equipped, as no pupils even from our best schools now are, for profitable observation at home, and for taking the most advantage of any opportunities of travel which may come to them in their future career.

CHAPTER IV

APPLIANCES IN GEOGRAPHICAL TEACHING

REFERENCE has been made in the foregoing pages to the great advantage of appeals to the eye in the teaching of geography, and to some of the more serviceable kinds of appliances at the command of teachers. In the present chapter I shall enumerate in further detail such aids in teaching as are most easily procurable. It will be understood, however, that no such list can be exhaustive. Every capable teacher will devise for himself new forms of apparatus, or new modifications and adaptations of old forms. But some assistance may be derived from an account of the more generally useful kinds.

MAPS.

I have said that maps supply the fundamental groundwork for good geographical instruction. It is therefore of the utmost consequence that the maps to be used for this purpose should be as good as can be obtained. Unfortunately most of those published in this country leave much to be desired in regard to clearness and intelligibility. Some of them are overloaded with names; others are so faintly coloured that the divisions cannot readily be followed. In almost all of them the topography is incorrectly or altogether inadequately expressed. Caterpillar-like tracks of shading, for example, are introduced to represent separate mountain-ranges where no such ranges exist; while the broad and essential topographical features of the country remain undistinguished. Hence the teacher, if he is called upon to

select maps, should choose them with care, or if he finds a series already provided for him, should endeavour to secure that its errors or imperfections do not seriously affect the impressions conveyed to the eyes and minds of his pupils. Admirable and comparatively cheap school-maps are published in Germany and Switzerland. As a rule, the best maps of foreign countries are produced in these countries. A French map of France, for instance, or a Swiss map of Switzerland, is more likely to be satisfactory than those prepared in this country. The essential qualities of a map for purposes of instruction are accuracy and clearness. No odd or new-fangled styles of colouring or engraving should be encouraged. The type of map employed even for the youngest classes should be similar to that of the best maps in ordinary use, so that the children have nothing to unlearn when they come to study more detailed maps than those on which they began. As few names as possible should be inserted on maps required for elementary teaching. A crowd of such details only hinders young pupils from seizing the main features of a country.

The first map to be used for the work of an elementary class is one of the school district. In Britain the large parish plans of the Ordnance Survey on the scale of 25 inches to the mile, or the particular sheets of county maps on the scale of 6 inches to a mile, are invaluable for educational purposes. A copy of one or both of these should be always kept hung on the wall of the schoolroom, that the eyes of the scholars may become familiarised with it from the beginning. With the map of the school locality on a large scale should be suspended the sheet of the general map of the country (in Great Britain on the scale of an inch to a mile) in which the locality is included. It is important to accustom the pupils to maps of the same district or country on different scales, and to note on these the relative size of the home district. The sense of geographical proportion is thus effectively educated.

While the large wall-maps are made the basis of the class lessons, the pupils from the time when they have

learnt the meaning and value of a map, should be required to provide themselves with small maps or atlases for home use. Many such maps and atlases have in recent years been published in this country, and can be procured at small cost. As a rule they err in overcrowding with names and in indistinctness of printing or colouring. The simplest and clearest are to be preferred, at least for the use of the junior classes. I have already insisted on the important part which maps ought to be made to take in the acquisition of geographical knowledge. They should be employed as the groundwork on which the fundamental conceptions of the geography of each country are to be built up, and the pupils should be encouraged to work out these conceptions for themselves from the data furnished by the maps rather than from the pages of a class-book. Hence good clear maps for home use are absolutely necessary. Certain tasks should be prescribed which can only be performed by diligent study of the maps, and for which the formal statements of the class-book are of little or no assistance. Most of the ordinary wall-maps for schools are what are called political; the subdivisions into counties, countries, or continents are the features to which they chiefly give prominence. Where the topographical characters are sufficiently expressed upon them, and are not too much thrown into the background by the depth of the political tints or a crowd of local names, these maps are on the whole the most generally useful. But where possible they ought to be largely supplemented by others. A few of the more important kinds of maps may here be enumerated, and further suggestions on the subject will be found in later chapters.

Physical Maps.—No thoroughly satisfactory system has yet been devised for expressing the physical features of the land upon maps. The common hill-shading is unsatisfactory, for while it brings into prominence the mountain ranges and isolated hills, it fails to distinguish the table-lands and plains. It expresses relative steepness, rather than relative elevation. The defects as well as the excellences of this system are well exhibited in the more recent

hill-shaded sheets of the one-inch Ordnance Map of Britain. The more mountainous tracts are admirably portrayed; the hills seem to stand out from their surrounding valleys as in a model, so that a mere cursory inspection of one of these maps conveys a vivid impression of the topography. But where the ground is less uneven the representation of it becomes proportionately unsuccessful. Slight inequalities on the lower grounds are shown by engraved shading, though they are of small dimensions compared with those at the higher altitudes. The light shading used for them requires to be deepened as the ground increases in height and steepness, till where the loftier and more precipitous uplands are reached, the shading has become so dark that the topographical names can scarcely be read through it, while tints of colour, easily recognisable over the areas of the low grounds, are quite lost in the blackness of the mountain districts.

Contour-lines supply an admirable method of depicting with accuracy the general topography of a country, where the surface varies considerably in the altitudes of its several parts. An instructive comparison may be made of the relative advantages of this system and ordinary shading, by placing together a copy of one of the hill-shaded maps of the Lake District (Sheet 101 of the Ordnance Survey of England and Wales), or of the tract around Ben Nevis (Sheet 53 of the Ordnance Survey of Scotland), and a copy of the same sheet in contours. The contoured map marks the precise altitude of successive levels from the sea-margin up to the tops of the highest hills, and enables the teacher to draw accurate sections across the country illustrative of the relative heights of hills, valleys, and plains. But it requires to be inspected closely before its details can be appreciated. It does not at once appeal to the eye as the shaded map does, but for purposes where accuracy of delineation of relative altitudes is required it is greatly to be preferred.

Various more or less successful combinations of shading and contour-lines have been devised. The hachures for

the slopes are sometimes printed in one colour and the contour-lines in another, so that the distinctness and ease of comprehension of the one system is supplemented by the more precise accuracy of the other. But such combinations are only practicable upon maps on a large scale. The difficulty of uniting these distinct qualities has led to the adoption of a system of coloured tints to mark off the areas of different elevations. All the ground below say 500 feet is in some of these maps left uncoloured or covered with a light tint of brown or other colour. The tracts between 500 and say 1000 feet are expressed by a darker tint and so on in successive darker shades up to the mountains. Maps of this kind are useful in teaching more advanced pupils, who have already learnt the meaning and use of a map. But they ought not to be used in junior classes. They are so artificial in their plan, represent the truth in such an unnatural and glaringly diagrammatic way, that they are apt to convey a most erroneous impression, unless the true relations of the several parts of the surface to each other have already been apprehended. But with senior classes they may be made of great value in many geographical questions which involve discussions of the ratio between the successive zones of elevation in a country. Physical maps of the British Islands prepared according to this method, have been issued by several publishing firms in this country.

Geological.—A good geological map of the district round the school, if it can be had, will be found of much service in the excursions and in discussing the relations between the forms of the surface and the nature of the rocks underneath. In Britain the sheets of the Geological Survey supply all that is needed. A general geological map of the whole country is an essential requisite for good geographical teaching. Geological maps of the British Isles, and of England and Wales, Scotland and Ireland, are published by Stanford of Charing Cross, and W. & A. K. Johnston of Edinburgh. The best geological map of Europe is Dumont's; but this will soon be superseded by

the large map now in course of preparation by the International Geological Congress. Geological maps of most of the Colonies and of India have been prepared by the Geological Surveys organised by the respective governments. There are good geological maps of most of the eastern and long-settled states of the American Union, but no satisfactory one of the whole United States has yet appeared.

There are endless ways in which the rocks below affect the scenery, soils, and vegetation, and by so doing have powerfully influenced the progress of the human population. These should on no account be passed over by the teacher, and they can be most effectively shown by a geological map. For the more advanced classes it is also desirable to exhibit geological sections of the district or country. The horizontal sections of the Geological Survey on the scale of 6 inches to a mile may be used with advantage. They represent the surface of the ground in true proportions of height and length, and show the nature and arrangements of the rocks underneath, as these would probably be found if they were bored into.

Special Maps.—Besides those here enumerated, many other maps are desirable which cannot as a rule be purchased, but which may be constructed by the teacher himself. Maps showing the distribution of earthquakes over the globe, of rain and storms, of plants and animals, of the human races, are to be found in atlases of physical geography. But these are on too small a scale for class purposes, and they cover only a very limited portion of the field which is open to the teacher. The task of map-making, though it requires time and patience, carries with it its own reward in the clearness and precision of conception which it enforces, and which are hardly obtainable so well from any other source. I do not mean that the teacher is to go through the mechanical drudgery of copying the ordinary geographical details of a map. He should procure a blank or uncoloured map of the country or continent he proposes to illustrate, either with or in many cases preferably without names. On this basis he proceeds to delineate the geograph-

ical features of the subject he has to teach, expressing by tints of colour the respective areas over which the divisions of the subject extend. Suppose, for instance, he proposes to explain to his pupils the gradual process of evolution by which the present political subdivisions of Great Britain have been attained. He should procure a series of blank maps of the country, and beginning with the earliest known conditions, depict the limits of races and peoples at successive epochs. The materials for such a series of maps exist in abundance. A good teacher may construct them from his own personal acquaintance with history. But if he hesitates in this respect, he has only to turn to Mr. Pearson's *Historical Maps of England*, to the atlas accompanying Mr. Freeman's *Historical Geography of Europe*, or to the valuable charts in the *Hand Atlas* of Spruner-Mencke. Such a series of maps enables him to convey to his class a more vivid, and probably a more lasting conception of the facts of history than can be gained merely by reading.

If a map on a much larger scale than any of the published editions should be required, it may be prepared with ease and rapidity in the following way. A photograph is taken of the map and the negative, used as a slide, is thrown by a magic lantern upon a wall. A sheet of paper of the desired size being hung upon the wall, the outlines and details of the map can be drawn as they are projected upon it from the lantern.

One of the great desiderata among the appliances for geographical teaching is a far larger and more varied supply of blank maps. It is a reproach to the condition of geographical education in this country that blank wall-maps of the British Isles except on a small and practically useless scale are not to be purchased among us. Last year, for instance, I had myself occasion to require a set of these maps and applied successively to three of the leading geographical firms in the country. In each case I was informed that there were objections to supply uncoloured impressions of the maps, and I only ultimately received them as a special favour and on paying a price that would prohibit

their general use. This state of matters cannot last much longer. As soon as teachers generally recognise the vast assistance to be derived from a series of large wall-maps coloured to illustrate every geographical aspect of the country, they will require an adequate supply of effective blank-maps, and it will be worth the while of an enterprising publisher to furnish them with what they need.

GLOBES.

A good school-globe is an indispensable instrument in geographical education. But, in my opinion, its use ought not to be begun until the pupil has a thorough comprehension of a map and of the relative proportions between different scales of maps and the actual features of Nature. The first impressions of a child are still those of the human race, that the earth is a plain over and under which sun and moon are moving. It is not needful to uproot this impression in order to make the understanding of a map possible. But when, from the simplest plans of the school locality, gradual progress has been made into maps of the surrounding district and of the country at large, the imagination of the pupils is trained to realise the spherical form of the earth, and will more readily pass from the flat map to the representation of the same area upon the curved surface of the globe. The meaning of lines of longitude and latitude, so hard at first to understand upon a map, is at once recognisable upon the globe. The true forms and proportions of land and sea which are often so greatly distorted upon maps are likewise understood.

A school globe should be as large as the purchase funds of the school will permit. It should not be too crowded with names of places. Most globes err greatly in this respect, the various countries being represented upon them as they are in the atlases, where the names of places obscure the rest of the topography. The geography of a school globe should be broad, clear and easily apprehended. At the most, only a few of the more important towns of a country should appear on it. It should depict with as

much distinctness as possible the leading physical features of the continents; and over the ocean spaces should represent the varying depth of the sea, the positions of the great ocean currents and other features affecting the earth as a planet. It is the broad characteristics of the planet which should especially be kept in view in the construction of a good school globe. The distribution of towns and cities can best be studied upon a good map.

Blackboard.

From an early stage in geographical instruction constant use should be made of the blackboard. The plan of the schoolroom, of the school and its playground, of the school surroundings, should be drawn upon the board on various scales by the master and repeated by the pupils. Outlines of objects mentioned in the lessons, and of which there are no available diagrams, should be made upon the board, likewise sections across a district or country, forms of hills or mountains, shapes of valleys and other parts of topography. As the pupils advance, they should be taught to use the blackboard freely for the delineation of the geography of a country or continent, at first from maps and afterwards from memory. In addition to the common white chalk in general use, great advantage will be found in the introduction of coloured chalks, which serve the purpose of the tints employed in ordinary maps. Another useful appliance is a blackboard with parallels and meridians, on Mercator's or any other projection, painted, or better still, incised upon its surface. This board serves as a handy groundwork for the construction of a map which may be wanted merely for a temporary purpose but where correct latitudes and longitudes are needed. It also affords good practice for the pupils, who should be asked to trace upon it from memory the outline of any part of the globe.

Though at first the blackboard is employed only by the master, it should in the end be largely made use of by the pupils. They should be trained to prompt and accurate

delineation of geographical facts, and the precision of their knowledge could not be more severely tested than by being expressed in graphic form. Whatever is drawn upon the board may generally with advantage be copied by the pupils upon their slates or in their note-books.

Models in Sand, Clay, or Pasteboard.

Models of the topography of the school surroundings, or of districts which can be visited in the class excursions, are of considerable service in impressing upon the youthful imagination the contours of a country, and the relations of the form of the surface to the flow of water. They may be extemporised in moist sand, with at first no great effort after accuracy of proportion, until the pupils are taught to realise the differences of level, and to be able to represent these in a rough general way. By degrees, as confidence in the use of the material is gained, greater precision of detail may be aimed at, until eventually an accurate model of the district on a true scale may be constructed. When the scale employed is sufficiently large, the vertical and horizontal proportions may be kept the same. This identity, indeed, ought to be maintained where practicable, for it presents a true picture of the relative heights and depths of the surface. In general, however, the heights bear so small a proportion to the horizontal distances that they are hardly visible unless exaggerated. If represented in their true proportions, they look much too low. But the exaggeration should always be restrained within as narrow limits as will suffice for the purpose in view, otherwise an erroneous and distorted impression of the actual heights and depths is obtained.

To guide the modeller in building up the model, an outline map of the district may be traced upon the board and at certain points on this map small pins cut to proper lengths may be driven into the board. The length of each pin left above the surface of the board should represent the height of the surface at that locality according to the vertical scale adopted. A little practice will give facility

in constructing a tolerably accurate representation of the topography of the district.

The pupils should be encouraged to cultivate this kind of geographical exercise. The natural instinct of children to display their constructive faculties in "sand-houses" and "mud-pies" can thus easily be turned to good account. Unconsciously they are led to observe the configuration of the region of their homes, and in reproducing it, even in the rudest kind of model, they learn practically to distinguish the leading characters of topography.

For the more advanced scholars who show any special aptitude in this kind of exercise modelling-clay may be provided, and greater care should then be taken to ensure accuracy of detail by increasing the number of pins to mark the levels, and the main outlines of the topography. The clay is to be built up to the level of the tops of these pins until the general configuration of the surface has been blocked out. Then from the index-map with a pair of compasses the details may be measured and inserted. The surface of clay must be kept moist under a damp cloth until the whole is finished, otherwise it will dry and crack. Should the completed model be considered worthy of preservation, a cast must be taken of it in plaster-of-Paris, from which copies of the model in the same material can be reproduced.

But where contoured maps are available a much more accurate method of modelling may be practised. Sheets of millboard or pasteboard of uniform quality are procured, the thickness of each of which is to represent a certain vertical height upon the map.[1] Suppose that the contour-lines are 100 feet apart, then the thickness of a sheet of the pasteboard would stand for 100 feet of height. The contour-lines are traced on tracing paper and then transferred to the pasteboard, which is cut out along these lines.

[1] The millboard or pasteboard sold in the shops is rather tough and not easily cut through. A better material might be specially made for the purpose. A penknife will do for the thinner kinds; a fine bow-saw is better for the thicker layers. Mr. Jordan uses a fret-saw worked by a treadle.

In this way, a series of irregular and progressively diminishing pieces of pasteboard is obtained, the last of which represent the highest areas of the district. By careful adjustment on a level table these detached bits of pasteboard are built up exactly as the successive contour-lines succeed each other on the map, and may be firmly pasted together so as to present a relief of the configuration of the district. Of course such a model is an unnatural representation of the actual facts, for there are no such terraced lines in Nature as the edges of the pasteboard sheets. But it has great value in impressing upon the eye the actual relative altitudes of the ground. As an excellent example of the construction of this kind of model, I may refer to the large model of the British Isles with the surrounding sea-basins and a portion of the continent, made by Mr. J. B. Jordan, for the educational collection of the South Kensington Museum. The horizontal scale is about 1 : 2,000,000, while the vertical scale is exaggerated twenty times. The contour-lines are at equal distances of 250 feet and are expressed by the edges of layers of cardboard, $\frac{1}{32}$ of an inch thick.

It is always practicable to produce a more natural representation of the country by filling in the actual configuration of the ground with plaster or other material, so as to efface the artificial delineation of the contour-lines expressed by the edges of the sheets of millboard. But the original contoured model, if carefully prepared, should be preserved, while casts can be taken from it if additional copies are required.

In connection with this subject, mention should here be made of relief-maps, of which many samples have been prepared and published. In theory, such maps may be defended for educational purposes, but in actual fact, with hardly an exception, they are failures. The relative heights are grossly exaggerated, and convey utterly false notions of the true configuration of the ground. This must necessarily be the case where, as usual, the area represented is vast and the scale of representation small. Nothing is really gained by such caricatures of Nature which cannot be achieved with

properly shaded maps. Indeed, the best use of a relief-map is probably to afford the groundwork for a shaded map, the shading being copied or photographed from the shadows cast by the relieved surface. In large scale maps of small countries, where the differences of altitude are considerable, and where consequently the heights can be delineated without such monstrous exaggeration, relief-maps may be constructed with advantage. The chain of the Alps, for instance, has been very effectively rendered in this way. A relief-map of the British Isles might be prepared which would form a useful appliance in teaching the general configuration of the country. But its unavoidable exaggeration of elevation would require to be restrained within the strictest practicable limits. It is not the mountain-chains which form the great bulk of the land, but the plains and tablelands. Any system of map-making, therefore, which represents the mountains as covering a far greater breadth of ground, and reaching a far greater relative height than they actually do, exalts them into undue prominence, and conveys or confirms an altogether erroneous impression of their importance.

Natural History Objects.

I have already referred to the great help to be derived from the exhibition of specimens of the actual objects referred to or described in the lessons. It is obvious that in so vast a field no precise directions can be given for the teacher's guidance. But if he keeps steadily in view that his aim should be to gather together only such specimens as will give most vividness and interest to his tuition, he will not be apt to degenerate into a mere collector of curiosities. His class-museum need not be extensive, but it should be as choice as he can make it. Nothing should be put into it, or at least nothing should be taken out of it for class instruction, but what is thoroughly fitted for the purpose, and about which the teacher has ample information at his command.

He should try to illustrate with some typical examples

the three kingdoms of Nature, minerals, plants, and animals. And in so doing he should, where practicable, begin with the productions of his own district. Local examples enable him to enforce his teaching by reference to the experience of his pupils.

In regard to minerals, it will be enough to procure specimens of some of the more common and important species. A few crystals of quartz, calcite, and felspar; some pieces of gypsum and sheets of mica would form quite a large enough collection to start with, and would furnish material for some interesting and profitable lessons. If the school should chance to lie in a district where other minerals abound, samples of them should be procured. When the attention of the scholars is directed to these objects during the class excursions, many good specimens may sometimes be picked up. In my own experience at the University of Edinburgh, I always found the greatest alacrity on the part of my students in searching for further specimens for the class-museum, and some of the best examples in that collection were obtained by them on these occasions.

The way in which separate minerals are built up into rocks may often be well illustrated by specimens gathered in the school locality. Thus samples of sand, gravel, clay, sandstone, puddingstone, shale, or limestone may be found in most places. Attention should especially be called to the more useful kinds of stone. The materials used in the construction of the schoolhouse, for example, should be well illustrated—the clay from which bricks are made, the slates used for the roof, the marble or freestone of the fireplaces, the flagstones of the stairs, or the stone of the walls. Then illustrations should be collected of the manufactured minerals. Thus, pieces of different iron-ores and samples of the stages in the extraction of metallic iron from them have a wonderful interest for children. The brass-work of the school may be illustrated by a similar selection of specimens, from the rough ores to the finished product.

But still more effective for riveting the attention of the pupils are samples of fossil plants and animals. These

serve as the most potent means of enforcing the truth that the geography of the earth's surface has undergone many mutations. A piece of shale or of coal, with bits of carbonised fern lying on its surface, at once appeals to the young imagination, and impresses it as no amount of mere talk could ever do. So too with a piece of limestone composed of stems of stone-lilies, or a bit of chalk with a shell or sea-urchin imbedded in it. From these simple and easily accessible objects, the teacher may expound some of the most fundamental doctrines of geological geography, while at the same time he excites in his scholars an interest in the subject which in many cases will endure throughout their lives, and be to them a source of infinite refreshment.

The vegetable kingdom should especially be illustrated by examples of the local flora. Some plants should be selected that show well the leading features of plant-structure—roots, stem, leaves, flower or fruit, and some of the more striking varieties of these. Useful plants claim particular attention. Thus the various cereals should be collected and exhibited, and their resemblances and differences should be pointed out. The more familiar wild flowers and garden plants should likewise be gathered and preserved, that their names and characters may be known. The leaves and fruits of the trees of the neighbourhood should, in a similar way, be collected and made available for instruction. For these purposes, a class herbarium should be instituted, and as its contents should be freely used, new dried specimens should constantly replace those which have suffered from use. The task of keeping it complete and in good condition will always be cheerfully undertaken by the pupils themselves.

The teacher who reads these pages must not imagine that I propose to insist on his being or becoming a botanist. All the knowledge which I urge him to acquire may be gained with very little trouble. An acquaintance with at least the more frequent and conspicuous flowering plants of his district will not involve him in any severe scientific research. He may obtain this amount of botanical skill

by the study of any elementary work on botany, from which with the use of actual specimens he can learn to distinguish the different parts of plants, and then of any good local botany. For the British Islands there are various good and inexpensive text-books, such as those by Babington and Hooker.

Besides the home flora, it is desirable to procure illustrations of such foreign plants as are of special value to man. Rice, maize, tea, coffee, sugar, pepper, indigo, and many other substances, may have an added interest given to them, if specimens can be shown of the original plants from which they are obtained, and of any stages in the process of their manufacture.

Of the animal kingdom it is of course impossible to attempt any adequate illustration. But some, at least, of the more conspicuous members of the home fauna may be collected, especially to show as far as practicable the leading types of animal structure. The land and pond snails may easily be gathered. Samples of the insect-life can also be procured without difficulty, and in this search the aid of the pupils will be of the greatest service. By degrees, some of the birds may be added to the stock, with probably stuffed specimens of some of the smaller mammals. Good articulated skeletons of a fish, a bird and a mammal should form part of the museum.

Specimens of foreign animals are as a whole of less importance than foreign plants for purposes of geographical teaching, and their size usually renders them altogether impossible adjuncts. But good coloured drawings of lions, tigers, elephants, camels, kangaroos, vultures, crocodiles, etc. are quite sufficient. Where a zoological garden exists, or a museum with stuffed specimens of animals, the teacher will take care to make good use of it in illustration of his geographical exercises. But some of the parts of the larger animals, when procurable, may be usefully collected, such, for instance, as tusks or teeth. Numerous smaller animals afford interesting objects for the class museum. Specimens of coral, for example, are easily procurable and

attractive. Animals useful or hurtful to man may also be profitably collected. Dried specimens of locusts, scorpions, and other so-called insect-plagues, are not difficult to obtain. Silk-worm moths and samples of their cocoons and of the process of unweaving the silk-fibre are also to be desired. The great aim in collecting all these objects is to give life to the lessons and vividness to the appreciation of the subjects of which the lessons treat. What boy or girl, for instance, would not carry away a tenfold more enduring impression of the destruction of wooden piers and the timbers of unprotected ships by the teredo, if an actual specimen of the wood full of perforations were shown to him?

Raw and Manufactured Articles.

To the usefulness of specimens illustrating some of the manufacturing industries, it is hardly needful to do more than merely again allude. A series of specimens exhibiting successive stages in the manufacture of cotton cloth, for example, is of universal interest; or when this cannot be had, a sample of the original cotton plant showing how the cotton fibre occurs in Nature. The manufacture of pins, needles, ropes, cloth, arrowroot, sugar, flour, pepper, may be advantageously illustrated by specimens.

In connection with this subject reference may be made to the value of illustrations of various conditions of human progress. The flint arrows and stone celts of the early races, the weapons, knives, needles and other implements of modern savages are full of interest to children as well as to adults. So too are specimens of the handiwork of uncivilised tribes, such as the leather and bead work of the North American Indians.

Diagrams, Photographs.

Reference has already been made to the great assistance which, in his appeals to the imagination of his pupils, the teacher derives from effective pictures that bring before their eyes the actual form which he seeks to describe in words. Pictorial representations rather than scientific diagrams

should in the first instance be employed. One series of these should illustrate typical phases of Nature, such, for instance, as a tropical jungle, a New Zealand woodland, a North American prairie, a South American savannah, a Rocky Mountain forest, an Arctic ice-field, a glacier, a volcano, a geyser, a waterfall, an alluvial plain. Another series should depict well-known scenes, such, for example, as some of the more illustrious or interesting buildings or cities of the world,—the Pyramids, the Parthenon, Stonehenge, Pompeii, Rome, Athens, Jerusalem, Paris, London Bridge, Edinburgh, Washington, etc. etc. A third series might be devoted to ethnographic types and bring before the eyes of the pupils the leading varieties of the great human family.

Some of these diagrams are already in existence. But it is much to be desired that a far more abundant and cheaper series of really good diagrams should be prepared. There can be little doubt that when the want of them is felt by the great body of our teachers, the demand for them will be met by a corresponding supply.

Photographs are now easily procured, and though for general teaching purposes less effective than good bold diagrams, they may be usefully employed where diagrams cannot be had, or where greater precision of detail is required. Views of scenery and of buildings and towns in all parts of the world can be purchased for a few pence each. These should be freely used in illustration of the different countries treated of in the lessons.

A magic lantern, or one of its modern modifications, will be found to be an admirable aid in conveying correct and vivid impressions of geographical and topographical features. Photographs when enlarged and thrown on the screen under brilliant illumination are better than the usual kind of painted diagrams, except that their want of colour sometimes rather diminishes their effectiveness. A good magic lantern or sciopticon may be employed for school use in the pictorial illustration of any objects that can be photographed or drawn upon glass slides. The teacher, if gifted with the powers of a draughtsman, may

sketch his own slides and thus provide himself with endless materials. The magic lantern is always highly popular with the scholars, though when employed it is more generally for their amusement than their instruction. But these two ends may be combined, and then the instrument is put to its best use.

I have already referred to the use that may be made of the magic lantern in preparing enlarged diagrams or maps. A map, drawing or engraving after being photographed on glass may in this way be greatly magnified, and when thrown by the lantern on the wall can be easily traced on paper. In this kind of diagram-making, children can sometimes lend efficient help. A photograph two inches square may easily be enlarged to ten feet square or 3600 times.

Books.

The teacher who would successfully conduct a geographical class must be provided with a sufficient supply of books of reference. His knowledge on every branch of his subject should be, as much as he can possibly make it, wider than that of the class-book which he prescribes to his pupils for the preparation of their lessons. He should be ready to expand the meagre statements of the book, and to invest its dry details with a human interest. To fit himself for this task, wide reading is essential. Books of history, of travel, of scientific exploration should be perused by him with an eye to his work, and notes should be made of those subjects which appear to him more particularly worthy of attention in connection with the work of geographical learners. He should also have at hand such standard works of reference as will supply him with the information which he may at any moment need. An exhaustive list of these would occupy many pages. I will here enumerate some of those more especially deserving of his attention in different departments of his subject. Of course I pass over most of the class-books for use in schools and colleges, assuming that he is already acquainted with these.

General Geography.

Nouvelle Géographie Universelle, la Terre et les Hommes. Elisée Reclus; Paris, Hachette, 1875 (a series of bulky volumes, forming a good compendium of geographical information).

Stanford's Compendium of Geography and Travel. Based on Hellwald's "Die Erde und ihre Völker."

This work includes the following volumes:—

"Europe." By F. W. Rudler and E. G. Chisholm. Edited by Sir Andrew C. Ramsay, 1885.

"Asia." By Augustus H. Keane. Edited by Sir Richard Temple, 1882.

"Africa." By the late Keith Johnston. Revised and corrected by E. G. Ravenstein (fourth edition, 1884).

"North America." Edited and enlarged by F. V. Hayden and A. R. C. Selwyn, 1883.

"Central America, the West Indies, and South America." Edited and extended by H. W. Bates (third edition, 1885).

"Australia." Edited and extended by Alfred R. Wallace (fourth edition, 1884).

The Library Cyclopædia of Geography, Descriptive, Physical, Political, and Historical; forming a new Gazetteer of the World. By James Bryce and Keith Johnston. New edition. With woodcut illustrations (London and Glasgow: William Collins, Sons, & Co., 1880).

The Imperial Gazetteer: a general dictionary of Geography. Edited by W. G. Blackie (London: Blackie & Son, 1878).

The Illustrated Universal Gazetteer. Edited by William Francis Ainsworth. With 400 wood engravings (London).

The Countries of the World; being a popular description of the various continents, islands, rivers, seas, and peoples of the Globe. By Robert Brown. Six volumes (London: Cassell, Petter, Galpin, & Co.)

The Peoples of the World. By Robert Brown. Six volumes (London: Cassell, Petter, Galpin, & Co., 1882).

Physical Geography.

Cosmos: Sketch of a Physical Description of the Universe. A. von Humboldt. Translated by E. Sabine (four volumes, 12mo, 1847-58).

Physical Geography. J. Herschel.

Physical Geography. Mrs. Somerville.

Physische Erdkunde. O. Peschel and G. Leipoldt (second edition, two volumes, 1884).

La Terre. E. Reclus, 1872 (translated into English by H. Woodward).

Die Erde als Weltkörper. Hann, 1884.

Allgemeine Orographie. Sonklar, 1873.

Inselstudien. Hann, 1883.

Text-book of Geology. A. Geikie, 1885 (or the smaller Class-book).

Volcanoes. G. P. Scrope (second edition, 1872).

Die Vulkanischen Erscheinungen der Erde. Fuchs, 1865.

Volcanoes (International Scientific Series). J. W. Judd, 1881.

Earthquakes and other Earth-movements (International Scientific Series). J. Milne, 1886.

Handbuch der Ozeanographie. Von Bognolawski, 1884.

Zür Mechanik der Meeresströmungen. Hoffman, 1884.

The Depths of the Sea. C. Wyville Thomson, 1873.

The Atlantic (Voyage of the *Challenger*). C. Wyville Thomson (two volumes, 8vo, 1877).

The Mediterranean. W. H. Smyth, 1854.

Handy Book of Meteorology. A. Buchan.

Atmosphere, Climate, Meteorology. Articles by A. Buchan in ninth edition Encyclopædia Britannica.

Handbuch der Klimatologie. Hann, 1883.

Grundzüge der Meteorologie. Mohn, 1883.

Handbuch der Gletscherkunde. A. Heim, 1885.

The great Physical Atlas of Berghaus, of which a new edition is now in course of publication.

Mathematical Geography.

Traité des Projections des Cartes Géographiques. A. Germain, Paris.

Mathematical Geography. A. R. Clarke. Encyclopædia Britannica, ninth edition, vol. x., p. 197.

Grundzüge der Mathematischen Geographie und der Landkarten-projektionen. Steinhauser, second edition, 1880.

Historical Geography.

Hand-Atlas für die Geschichte des Mittelalters und der neueren Zeit. Spruner and Mencke. Third edition, 1880. Gotha, Justus Perthes.

Historical Geography of Europe. E. A. Freeman.

Words and Places. I. Taylor.

Commercial Geography. (Statistics.)

Dictionary of Commerce and Commercial Navigation. J. R. M'Culloch.

Handels-Geographie. Carl Zehden, fifth edition, 1886.

The Statesman's Year-Book. J. S. Keltie (published annually and containing a large mass of accurate statistics of the different countries of the world).

Her Majesty's Colonies, a series of original Papers issued under the authority of the Royal Commission of the Colonial and Indian Exhibition 1886.

Board of Trade Journal published by Her Majesty's Stationery Office.

Botanical Geography.

Vegetation der Erde. A. Grisebach. Two volumes, 8vo. Leipzig, 1884.

Report on Present State of Knowledge of various Insular Floras. W. B. Hemsley. (in Report of *Challenger* Expedition, but purchasable separately, price 2s.), 1885.

Versuch einer Entwickelungsgeschichte des Pflanzenwelt. Engler. Two volumes, 1879-80.

Zoological Geography.

The Geographical Distribution of Animals. A. R. Wallace. Two volumes, 8vo, 1876.

Island Life. A. R. Wallace. 8vo, 1880.
The Geographical Distribution of Mammals. A. Murray. 4to, 1866.
The Natural History of Man. J. C. Prichard, 1855.
Völkerkunde. O. Peschel, 1884.
Anthropogeographie. Ratzel, 1882.
Brown's Peoples of the World, above cited.

Books of Travel.

1.—*General.*

The Principal Navigations, Voyages, Traffiques, and Discoveries of the English Nation made by Sea or Overland to the remote and farthest distant quarters of the Earth at any time within the compasse of these 1600 yeres. By Richard Hakluyt. Three volumes, 1599. New edition, with additions, in five volumes, issued in 1809.

Purchas His Pilgrimes. Five volumes, 1625.

Churchill's Collection of Voyages and Travels. Eight volumes, 1704-47.

The World Displayed: or, A Curious Collection of Voyages and Travels, selected from the writers of all nations. Twenty-one volumes, 1767-68.

Phillips's Collection of Modern and Contemporary Voyages and Travels. Eleven volumes, 1805-10.

A General Collection of the best and most interesting Voyages and Travels in all parts of the World. By John Pinkerton. Seventeen volumes, 1808-17.

A General History and Collection of Voyages and Travels, arranged in systematic order. By Robert Kerr. Eighteen volumes, 1811-24.

The Publications of the Hakluyt Society, instituted in 1846.

Several reprints of the old Voyages have recently appeared in Cassell's National Library in convenient form, price 3d.

2.—*Europe (a few of the earlier general works of Travel are here given, and one or two of the modern accounts of less visited districts).*

A Brief Account of some Travels in divers parts of Europe, viz.: Hungaria, Servia, Bulgaria, Macedonia, Thessaly, Austria, Styria, Carinthia, Carniola, and Friuli. Through a great part of Germany and the Low Countries. Through Marca Trevisana, and Lombardy on both sides the Po. By Edward Brown,[1] 1685.

Observations made on two voyages through most parts of Europe. By J. Northleigh, 1702.

The Grand Tour: or, A Journey through the Netherlands, Germany, Italy, and France. By M. Nugent, 1778.

Travels in Europe, Asia, and Africa. By Edward Daniel Clarke, 1816-24. Vols. i. and ii.: Russia, Tartary, and Turkey. Vols. iii.-viii.: Greece, Egypt, and the Holy Land, with a Journey from Constantinople to Vienna, and an account of the Gold Mines of Transylvania and Hungary. Vols. ix.-xi.: Scandinavia.

Travels in Europe and Africa. By Col. Keatinge, 1816.

Six Months' Tour through the North of England. By Arthur Young, 1770.

Farmer's Tour through the East of England. By Arthur Young, 1771.

[1] Son of Sir Thomas Browne, author of *Religio Medici*.

Tour in Ireland. By Arthur Young, 1780.

Travels in France in 1787-89. By Arthur Young, 1792.

A Tour in Scotland and Voyage to the Hebrides in 1772. By Thomas Pennant, 1774.

Journal of a Residence in Norway during the years 1834-35-36. By Samuel Laing, 1836.

A Tour in Sweden in 1838. By Samuel Laing, 1839.

Italy: with Sketches of Spain and Portugal. By the author of "Vathek" (W. Beckford), 1834.

Scrambles amongst the Alps in the years 1860-69. By Edward Whymper (second edition, 1871).

Ultima Thule: or, A Summer in Iceland. By Richard F. Burton, 1875.

Untrodden Spain. By H. J. Rose, 1875.

Picturesque Holland: a Journey in the Provinces of Friesland, Groningen, Drenthe, Overyssel, Guelders, and Limbourg. By Henry Havond, Translated from the French, 1876.

3.—*Asia.*

The Book of Ser Marco Polo, the Venetian, concerning the Kingdoms and Marvels of the East. Newly translated and edited, with notes, maps, and other illustrations, by Col. Henry Yule, two volumes, 1875.

Travels through several Parts of Asia. By A. Drummond, 1754.

Travels into Bokhara, 1831-32-33. By Lieutenant A. Burnes, 1834.

Recollections of a Journey through Tartary, Tibet, and China, in 1844-46. By E. R. Huc. Translated from the French, 1852.

Narrative of a Year's Journey through Central and Eastern Arabia. By W. T. Palgrave, 1864.

Travels in Central Asia. By Arminius Vambéry, 1864.

Journeys in Northern China. By Alexander Williamson, 1870.

The Missionary in Asia Minor. By H. van Lennep, 1870.

The Abode of Snow: Observations on a Journey from Chinese Tibet to the Indian Caucasus, through the upper valleys of the Himalaya. By Andrew Wilson, 1875.

Mongolia, the Tangut Country, and the Solitudes of Northern Tibet; being a narrative of three years' travel in Eastern High Asia. By Lieutenant-Colonel N. Prejevalsky. Translated by E. Delmar Morgan, 1876.

The Jummo and Kashmir Territories. By F. Drew, 1875.

From Kulja, across the Tian Shan to Tob-Nor. By Lieutenant-Colonel Prejevalsky. Translated by E. D. Morgan, 1879.

The Roof of the World: Journey over the High Plateau of Tibet to the Russian Frontier, and the Oxus Sources on Pamir. By Lieutenant-Colonel T. E. Gordon, 1876.

4.—*Africa.*

Travels to discover the Sources of the Nile, in the years 1768-73. By James Bruce, 1790.

Bruce's Travels into Abyssinia to discover the Source of the Nile. Abridged by S. Shaw, 1790.

Travels in the Interior of Africa. By Mungo Park, 1799.

Missionary Travels and Researches in South Africa. By David Livingstone, 1857.

Wanderings in Western Africa. By R. F. Burton, 1863.

Journal of the Discovery of the Source of the Nile. By Captain J. H. Speke, 1863.

A Walk across Africa. By J. H. Grant, 1864.

Letters from Egypt, 1863-65. By Lady Duff Gordon, 1865.

The Albert N'yanza. By Sir Samuel White Baker, 1866.

The Nile Tributaries of Abyssinia. By Sir Samuel White Baker, 1871.

The Heart of Africa: Three Years' Travels and Adventures in the Unexplored Regions of Central Africa. By G. Schweinfurth. Translated by Ellen E. Frewer, 1873.

Across Africa. By V. L. Cameron, 1877.

Through the Dark Continent: or, The Sources of the Nile around the Great Lakes of Equatorial Africa, and down Livingstone River to the Atlantic Ocean. By H. M. Stanley, 1878.

To the Central African Lakes and Back. By Joseph Thomson, 1881.

5.—*North America.*

Voyages to North America. By Baron de Lahontan, 1703.

Travels in North America. By P. Kalm, 1772.

Travels in North America in 1766-68. By Captain J. Carver (third edition, 1781).

Travels in North America in 1780-82. By Marquis de Charteleux. Translated from the French (second edition, 1787).

Voyages and Travels, describing the North American Indians. By J. Long, 1791.

Travels through the Interior of North America. By Captain T. Anburey, 1791.

Travels in North America in 1827-28. By B. Hall, 1829.

Journal of Residence and Tour in the United States of North America, 1833-34. By E. S. Abdy, 1835.

Seven Years' Travel in Central America, Northern Mexico, and the Far West of the United States. By J. Fröbel, 1859.

New Tracks in North America. By W. A. Bell, 1870.

6.—*South America.*

Voyage to South America. By A. de Ulloa. Translated from the Spanish, 1806.

Travels in South America. By F. Depons, 1807.

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CHAPTER V

THE ELEMENTARY STAGE OF GEOGRAPHICAL TEACHING

Early Conceptions of the Relative Sizes, Positions, and Heights of Things.

In offering some suggestions for the practical teaching of geography, I begin by repeating a remark made in a previous page, that in order to lay a broad and firm basis for his lessons, the teacher must take his pupils at almost the outset of their school-life, and begin by engaging their attention to objects that may seem to be but remotely connected with what is usually taught as geography. Children of six or seven years of age are not too young to enter, with enjoyment and profit, upon the course of instruction he can provide for them. His first aim should be to get them to use their eyes intelligently. If he has learnt himself to realise of what enormous importance in the general affairs of life a cultivated faculty of observation is, how much it fosters independence and self-reliance, and how greatly it adds to the pleasure of existence, he will spare no pains to develop it in the young generation committed to his charge. For this end he will be content to confine his lessons for a time to the most familiar things, such as come within the daily experience of his pupils. The objects in the class-room, in the playground, or in the neighbourhood; the sky, clouds, rain, sunshine, flowers, trees, birds, insects; everything, in short, which the children can see for themselves, may be taken as texts for the lessons. Enlisting their interest by the way in which he puts his questions, the teacher will gradually elicit all that his scholars can tell him from their

own observations. He will correct the different answers, and sum up the general experience, adding such remarks of his own as may be needed to correct and complete the information obtained.

The reader is no doubt familiar with Mrs. Barbauld's famous story of *Eyes and No Eyes.* If he is not, let him read it forthwith. It is worth a thousand educational treatises. Never shall I forget the impression it made on myself when as a young boy I first came upon it. Every step of William's walk was to me a subject of engrossing interest. I tried myself to make similar observations, and was delighted in particular to recognise the movements of a lapwing in a succeeding country ramble. To this day, such is the permanence of early associations, the swoop and scream of that bird overhead brings back to me these first impressions of boyhood, and reminds me of my lifelong debt to the *Evenings at Home.* The story ought not only to be known to the teacher, he should make it thoroughly familiar to his pupils as soon as they are of an age to understand and enjoy it.

The contrast between the two boys in this story is one which may be found in every schoolroom. Unless a teacher actually tries the experiment, he can scarcely imagine the extraordinary differences in powers of observation, not so much between clever and dull pupils, for that might be looked for, as among those who are bright and forward in the general work of the school. Of two clever boys, the one who has the quicker perception of things around him is more likely to succeed in life. But the chances of the other may be vastly improved by early training. And it is this training, so little provided for by the ordinary school-work, that the teacher should do all in his power to secure.

The subjects selected for the lessons, and the way of treating them, should be such as to win the sympathy and enlist the active interest even of the youngest pupils. One of the most effective, and at the same time convenient ways of gaining this end is to engage the class in exercises which

require something to be practically done. The mental effort to realise elementary conceptions of matter, space, and time, is aided, and the conceptions are made clearer and more enduring by concomitant bodily action. The principle here involved is the same as that which I have already insisted upon. The children should learn not so much what they can read or what is told to them, as what they can make out for themselves. They are to be treated not as sacks into which as much information as possible is to be stuffed, but as gifted with a delicate machinery which they are to be taught how to use for their own instruction and guidance. Each of them is a little discoverer exploring for himself the mystery of this world, and needing all the help he can get to widen the little circle of light in which he stands. And in no way can he be aided more effectually than by being taught to use eyes, hands, and feet, and to judge accurately of the data which they enable him to collect. How this may be done in the simplest way I will here illustrate by reference to the manner in which accurate elementary ideas of the relative sizes and positions of things may be acquired.

1. *Relative Sizes of Things.*

During infancy we learn that things differ in size and in distance from us. How much they differ in these respects is found out more slowly, if indeed discovered at all. Among the peasantry many adults may be met with who have hardly advanced a step beyond the infantile stage of perception. And even among those who consider themselves educated, it is sometimes ludicrous to see how absolutely untrained they are to judge with even an approach to accuracy of the relative sizes and distances of things.

One of the most useful lessons, therefore, in the elementary part of geographical instruction, is to accustom the pupils to appreciate differences of size and proportion by actual measurement. The most convenient unit of measure to start with is the length of a pace, while the

schoolroom is the most convenient place to try the first experiments in mensuration. The teacher should begin by pacing the length and breadth of the room, showing the pupils how the operation is to be performed. A few of the taller members of the class should then be asked to repeat the measurement, and afterwards some of the more diminutive. Some practice is required to ensure approximate equality in the length of each pupil's paces, and during this practice every scholar should be called upon to go through the process. From the class-room the pacing should be transferred to the playground, and like squads of recruits at drill, the scholars, ranged according to size, should be made to march from side to side and from end to end, counting steps as they go. Exercises of this nature may form an appropriate part of some of the earlier lessons.

When the art of measuring distances by pacing has been learnt, the teacher will call attention to the different length of the paces in the taller and shorter members of the class. The fact that he himself makes the class-room say ten paces, while the younger scholars take twenty paces or more, should be pointed out, and the length of the paces of a few pupils should be measured on the floor by pieces of string. These cut into the respective lengths and suspended in front of the class show the great discrepance in the units of measure.

The next step is to explain the necessity for some uniform standard of length. It is not enough to say that the schoolroom is so many paces long; we must know the dimensions of the pace by which it is measured. Having made this point clear, the teacher will proceed to give a simple account of the smaller measures of length which have been adopted in this country,—the foot as the unit, divided into twelve parts or inches. It will not be needful to go at first beyond feet. Care must be taken to familiarise the pupils with the length of a foot and of an inch. A line or band 3 feet long should be drawn or painted on some conspicuous part of the schoolroom wall, divided into feet, and one of these feet into inches, and

this line should be referred to as the standard of measurement. It is useful to mark off a scale of inches on one side of the frame of each school slate, where the eye by constantly looking at it becomes accustomed to the length of its divisions. A tape-line or yard-measure should form one of the earliest pieces of apparatus employed in the class. It should be put to constant use until the scholars are thoroughly accustomed to measure the length and breadth of things, both inside and outside the school. The earliest measurements should be along straight lines such as a wall or table, where the tape-line can easily be kept in place; then should come diagonal measurements, as from one corner of the playground to another.

Exercises of this kind should be continued until the class has become familiar with the length of an inch and a foot, and with the relative distances from one point to another in the school and playground. Too much care can hardly be bestowed upon this part of the training, for it forms the groundwork from which the children will advance to form just conceptions of size and distance in geography. By multiplying the measurements they have taken at school, they will appreciate how far it is from school to their homes, what distance separates their village or town from the next, what is the size of their parish or county; and so on to the country as a whole and eventually to the dimensions of the earth itself and of planetary space. When larger distances come into notice in the progress of the lessons, the other standards of measure will be enumerated, and explanations should then be given of the meaning of the words—yard, pole, furlong, mile, and so on. The history of some of these terms is full of interest, and when told to the learner helps to fix their meaning in his mind. In later lessons the metrical system of measurement should be duly explained, and to make it more familiar the class should be required to measure spaces about the school in metres, using a rod or tape-line a metre or more in length divided into centimetres.

2. *Relative Positions of Things.*

If want of accuracy in judging of the dimensions of things is a common failing, not less prevalent is want of accuracy in judging of their relative positions, or what is called orientation. We begin in infancy with the difference between our right and left hands, and recognise things and places as lying to the right or left of us. But many of us hardly get beyond this rudimentary stage. It is almost incredible how helpless even educated people often are if asked to tell whether one place lies to the north or south of another. They know that in passing between them you go to the right or left as the case may be, but there their power of localisation ends. What is needed is greater quickness and precision in orientation, and this ought to be acquired from early training at school.

The teacher will find in this subject ample material for interesting and profitable instruction, which as before he will make as practical as possible. He starts of course with the convenient standard of right and left. Many of the younger children will be found to be rather vague as to which is their right and which their left hand. They should be made to exercise now the right, now the left arm, extending them, holding them vertically or keeping them slanted. By varying the exercise and making the whole class go through it simultaneously, the teacher will impress the distinction and detect any mistakes. In the play-ground the scholars will be taught to march now to right now to left, and these evolutions are to be repeated until the distinction of right and left is completely comprehended.

From this basis of acquirement, the next step is to point out that right and left are not uniform directions, but depend on the quarter to which we look. Two pupils placed face to face may be asked to move to their right, and of course they retreat from each other in exactly opposite directions. The same experiment may be varied in different ways, with the object of showing the necessity

for some uniform standard of direction, which shall hold true no matter how much we may alter our position.

The scholars should be asked to point out such a uniform standard if they know it. Some may in answer say that north, south, east, and west are uniform directions. They should be required to tell how they know where north, south, east, and west are. A few may be able to answer, but probably in such a way as they have learned from mere hearsay. In determining this point and teaching the pupils how to fix it for themselves, an important step in geographical instruction is reached.

The sun's course across the sky should be pointed out by actual observation. There are probably few schools in the country where this cannot be more or less effectually done. The lessons are best learnt in the open air with a sufficient breadth of heaven to let the shadow of an object be seen in the morning, at noon, and in the afternoon, or evening. The shadows of walls, trees, or other objects should be followed and traced on the ground. Where distant objects can be seen attention should be drawn to the different positions of the shadows in the morning and in the evening. A range of hills, for instance, or a line of woods will be seen to change its aspect considerably according as the light falls on it from the one side or the other.

In the part of the playground which gets most sunshine, a short pointed post should be fixed in the ground, and the shadow which it casts should be watched. The class should be made to examine it in the morning before beginning lessons, and mark the exact spot reached by the end of the shadow, say at nine o'clock. A few hours later, as opportunity occurs, the post must be again looked at and the end of the shadow marked as before. In the afternoon as the school is dismissed another observation may be made. The curve described by the shadow of the post may then be drawn on the ground.

The relation between the length of the shadow and the position of the sun in the sky must now be made clear, and illustrated by numerous observations, and by reference to

the experience of the scholars themselves, who will at once remember how much longer a shadow each of them casts in the evening than at midday. When this relation has been comprehended, recourse should be had once more to the post in the playground, and the pupils should be asked to ascertain in what position the sun stands highest in the sky, and casts the shortest shadow. That position is south.

Having thus determined accurately where south lies, the fixing of the other cardinal points will be easily understood. But in order to ensure the complete mastery of these ideas, the exercises should be repeated again and again, and should be varied in successive different ways until the pupils acquire facility in them. A due north and south line in continuation of the midday shadow of the post should be drawn on the playground. A line at right angles to this should likewise be traced to show the positions of east and west. Then the children should be exercised in marching to the four cardinal points of the compass. They should be trained to judge how things are placed with reference to these points. To aid them, the meridian line ought to be conspicuously and permanently marked for their guidance. This should be incised or painted on the schoolroom floor, and should also be shown by stones or posts placed on the meridian line on opposite sides of the playground.

At as early a period as may be practicable, the lessons of the class-room and playground may be profitably extended by excursions to short distances, easily reachable by walking from the school. In later chapters I will consider more in detail the practical conduct of these out-of-door lessons. When the four quarters of the heavens have become familiar to the pupils, it should form a part of the work in every walk to fix the cardinal points, and to determine the relative positions of objects, first with regard to the pupils and then in respect of each other. At occasional halts, the teacher should request that the various landmarks—houses, spires, chimneys, trees, and so on, lying to the south, north, east, or west, should be pointed out. Then

as the walk is extended, the same object which at first lay toward one quarter will be found to lie exactly in the opposite direction. This will lead to the determination of the actual positions of the several landmarks with regard to each other. To observations of this nature many rambles may be most usefully devoted. Of course the teacher will take care to keep the attention of his scholars continually on the alert, by requesting them to notice things as they pass along, asking them to say what they see and what they infer from it. Aspects of the sky, direction of the wind, changes of weather, varieties of foliage, flowers, and trees, forms of insects and birds, characteristics of buildings ancient or modern—these and endless other subjects will naturally arise in the course of the walks, as themes to which the eyes and minds of the pupils may be drawn and from which many delightful lessons may be taught.

When some practice has been acquired in measuring and estimating the relative sizes, distances, and positions of objects, the teacher should begin to accustom his class to the representation of these relations in a plan or map. As the comprehension of a map is the great goal of the elementary stage of geographical teaching, this subject should be approached deliberately, and with the resolution to make it thoroughly intelligible and attractive. The teacher should himself make the first plans on the blackboard, and without any special attempt at accuracy. His aim must be to get the youthful imagination to realise how a series of white lines on a black board, or of black lines on paper can represent the forms and proportions of our surroundings. Some children acquire this knowledge only with extreme labour, and it probably involves in most cases a greater mental effort than their elders suppose. The form of the schoolroom should be drawn on the board with the positions of the door, windows, and fireplace. Then the places occupied by the master's desk and the pupils' benches, and any other furniture, should be inserted. It is better at first not to make the plan to scale, but with practice the teacher will easily be able to draw it with

approximate correctness. When the plan on the board has been explained, and its relation to the actual objects depicted is generally understood by the class, it may be slightly varied by altering the positions of some of the furniture. These drawing exercises should be repeated on the board by one or two of the pupils, and then the board having been rubbed clean the class may be required to sketch a plan of the schoolroom on their slates. By varying the arrangements of the room, considerable practice in plan drawing may be gained.

As this stage of progress is of such ultimate importance, it ought not to be hurried over. The exercises should be indefinitely varied, so as to accustom the eyes of the pupils to the representation of the forms and proportions of things. From the schoolroom, the plans may proceed to include the school-house and playground. Reducing the proportions, the teacher may next show the position of the school and playground among their surroundings. The roads by which the children come to school may be drawn in, together with any well-known building or other object by the way. These drawings on the blackboard by the master need not be too laboured, and should be merely general sketches, which a little practice will enable him to render with sufficient justness of proportion for the purpose. It is useful to keep the upper side of the board for north, the left for west, the bottom for south, and the right for east. The eye thus becomes accustomed from the outset to the relative positions shown on maps.

The scholars must be encouraged to try all kinds of delineations for themselves. They should sketch plans of their own homes, and bring these for criticism by the master. It is not necessary at first to insist on strict accuracy, though attention should be called to the more glaring imperfections of drawing. It is of much more consequence that a just conception of the meaning of a plan or map should first be gained.

At a later stage of tuition an endeavour should be made to introduce accuracy into the plans of localities. Several

slates containing plans of the schoolroom that differ most widely from each other in relative proportions should be held up for the inspection of the class. It should be pointed out that they cannot all be correct for they all represent the same things. And the need of accuracy should be dwelt upon. How is this accuracy to be obtained? Probably some of the class can answer the question, for they have now been accustomed to actual measurement. The correct dimensions of the schoolroom having been again measured and written down, a plan of the room with some of its more conspicuous contents should now be drawn to scale on the blackboard by the teacher. The scale selected will of course depend upon the relative dimensions of the room and the board, but should be as large as may be convenient, and should be conspicuously drawn upon the board at the outset, so that the gradual correct filling in of the plan may be followed. Some of the pupils may then be called upon to draw additional plans upon other scales, and the different drawings should be allowed to remain on the board that the class may become familiar with the persistence of the same proportions notwithstanding the differences of size. Errors in any drawings should be required to be discovered and corrected by the class. The face of the board may now be turned to the wall, and the scholars may be asked to draw on their slates a correct plan of at least the four walls of the room on a given scale, which should be supplied to them on slips of cardboard, or which they may make for themselves from the subdivisions of the inches inscribed on the frames of their slates.

It should be pointed out that whereas among the sketches drawn merely by the eye in an earlier series of lessons, no two quite agreed in their proportions, those now correctly drawn to scale are all alike, their differences being mostly due to varying neatness of hand. Accuracy and neatness should be required in the construction of these plans. And the pupils, as before, may with advantage be encouraged to make correct proportional plans of their sitting-rooms at home, and to cultivate the practice of this

kind of drawing in endless different ways. By this means they acquire correctness of eye and deftness of hand, and they fit themselves more thoroughly than is otherwise possible for early and satisfactory progress in the use of maps.

3. *Relative Heights of Things.*

Though of less practical consequence than just conceptions of relative size and position, correct notions of relative height should be early inculcated. It is of comparatively little moment whether children can make an approximate guess at the height of a particular house or spire; but it is important that they should be able to realise what a height of so many feet or hundreds of feet above the surface really is, and thus to appreciate the actual and relative elevations of hills and mountains.

In acquiring their earliest corrected ideas on this subject, they should as before begin with what is immediately around them. Much amusement may be obtained by commencing with the measurement of the heights of some of the pupils themselves. The smallest and the tallest boy, with a few of intermediate grade may be selected, and their respective heights legibly marked on the wall, with the precise amount in feet and inches. The teacher's own height may also be taken. The question should then be asked how many times the ceiling is higher than the smallest or the tallest boy. Various guesses will be made more or less wide of the truth. The actual height of the ceiling will then be measured, and the ratio between it and the heights of the pupils will be ascertained. It is easy, with a little tact and firmness on the part of the teacher, to guard against undue levity in these exercises. He should enjoy the fun of them himself, and allow it to be enjoyed fully by his scholars, but without for a moment letting its serious side be lost sight of. Such a mingling of amusement and instruction gives him a strong hold on the affections and sympathy of his juvenile audience.

We should bear in mind that absolute measures of large

dimensions convey no meaning to the young intelligence. But when they are translated into multiples of some familiar object, their true value is gradually appreciated. While this holds true of all measures of space it is especially felt in regard to altitudes. Relative horizontal distances are more quickly realised, because they sooner form part of our personal experience. But while every day increases a child's familiarity with things on the surface of the land, it is only for the most part at rare intervals that opportunities occur of rising above that surface and of judging of relative heights.

Having estimated by the eye, and checked by actual measurement the height of objects within the school, the class should next be exercised in a similar way out-of-doors. The height of the schoolhouse, of the boundary walls, of trees, and the objects within the school-bounds should be estimated and measured. Then attention should be directed to some well-known buildings, or natural eminences in the neighbourhood with the heights of which the teacher is acquainted. Thus he may refer to a particular spire as being exactly three times the height of the schoolhouse; or he may say, in allusion to some hill in the vicinity, that ten schoolhouses piled one on the top of the other will only reach to its top. He may obviously vary these exercises indefinitely, but always keeping in view the main object of giving the class a facility in realising the value of different altitudes. At a more advanced stage of progress, when he initiates them into some of the simple operations of land measurement, he will take the opportunity of showing them how to ascertain heights with approximate accuracy.

CHAPTER VI

ELEMENTARY IDEAS OF TIME

It is desirable to ascertain and arrange the conceptions children already possess as to time. They know that day and night follow each other in unbroken succession. They further know that each day has a morning, a noon, and an evening. These and their other notions should be drawn from them by questioning, and the answers, corrected by the class (or by the master if no member of the class has the requisite information), should be methodically summarised and repeated in the simplest language, as the basis of actual experience from which the pupils are to advance to further acquisitions of knowledge.

Special attention should first be given to the alternation of day and night. Nothing should at first be said about the earth's real movement round the sun, but the apparent circulation of the sun round the earth should be accepted, and the language of ordinary life should be used. The observations already taken by the class in determining the points of the compass, have brought more vividly home to them that the sun rises in the morning, mounts across the sky, reaches his highest point at noon, and then descending towards the west, sets in the evening. Returning to these observations, care should now be taken to show how regularly the shadow cast by a fixed post travels round its path upon the ground. Every day at noon it returns to the same central north and south line. Every morning when school begins, the shadow is away on the western side, and every afternoon at the close of school-work it has got round to the eastern side.

The previous watching of the course of the shadow in fixing the cardinal points, will have prepared the pupils for understanding how this regular movement can be made to serve as a basis for dividing time into accurately defined parts. A day should be explained to them as determined by the apparent motion of the sun. The meaning of day and night should be simply described, but without upsetting their belief that the sun goes round the earth. The true nature of the movement will be made known to them in due time.

More precise examinations of the course of the shadow should now be undertaken, and marks should be made at successive hours to show its precise position. Rough determinations upon the ground are sufficient at first, until the regularity and constancy of the sun's motion are realised. A sun-dial may afterwards be constructed, the readings of which should be frequently noted by the class. Having in this manner grasped firmly the idea that the fundamental division of time is into days, and is determined by the apparent motion of the sun across the heavens, the pupils may advance to the consideration of how the day is subdivided. The terms morning, forenoon, noon, afternoon, evening, night, are not definite enough. We need a precise subdivision, so as to be able to tell exactly when something has happened or is to be expected. The useful but entirely artificial arrangement of the day into twelve or rather into twenty-four hours, should then be fully illustrated, with an explanation of why we begin counting from midday when the sun is highest in the sky. Reference should also be made to the twelve hours before noon or morning hours, (A.M.) and the twelve after noon or post-meridian hours, (P.M.) As the sun is our time-measure (of course the earth itself, by its movement of rotation, will be afterwards shown to be so), the sun-dial which chronicles the actual passage of the sun across the sky is the most natural form of appliance for marking the passage of time. But it is too inconvenient for general use, inasmuch as it can for the most part be of service only out-of-doors and merely when the

sun is shining. The need of some kind of artificial time-measure that shall show the march of time inside houses, and by night as well as by day, will be readily understood by the pupils. An account of some mechanical inventions for registering the hours may then be given—the ancient clepsydra, the sand-glass, and other forms of hour-glass. Clocks and watches should be explained in such simple and intelligible language as is suited to the comprehension of the children, if possible with the help of models or diagrams. A clock-dial with hands but without interior mechanism is a useful piece of apparatus for teaching children to tell the time by a clock or watch. The hands should be moved to different hours, and repeated exercises should be given with them until some precision and quickness are obtained in reading the time they indicate. While these exercises are in progress, constant reference will be made to the occupations of the children at the hours marked. Thus at nine in the morning they probably come to school; at nine in the evening they are, or ought to be, in bed. The number of hours devoted to school-life, to play, to sleep, should be incidentally asked. In every way, the subjects of the lessons should be connected with the ordinary life and doings of the class.

From the day, we naturally pass to the week, as the next division of time. The probable origin of the "week," and its convenience as a division of the lunar month and of the solar year, will be considered in a later part of the instruction. Taking the term as an accepted interval, the teacher will gather from the pupils all that they can tell him about it. Its subdivision into seven days, with the names and order of succession of these days, may be already familiar knowledge to them. But they should be exercised in these names till their order is as well known as the hours of the day. Opportunity should be taken to convey some interesting information about the names given to the days of the week. The Saxon names chosen from the gods of our heathen ancestors should be explained, and a little account given of each of the deities after whom a day

was named. Afterwards the original Latin names of which our Saxon terms were adopted as equivalents may be enumerated.

When the days of the week have been well explained, and are quite familiar to the class, the names and order of the months may be similarly treated. A simple and interesting account of the meaning of each of these names should be given, as far as that can be done without requiring knowledge which the pupils do not yet possess. The order of the months should be impressed on the memory, and to aid this task the more marked characteristics of each month should be given, such, for instance, as its typical kind of weather—snowy December, sultry June; or its relation to vegetation, as where it comes with abundant leafage or finds the trees all bare.

Connected with the months is the order of succession of the seasons, which ought also to be learnt, but without entering upon the astronomical aspect of the subject, which of course, must remain for a later period. The name of each season should be explained, and the characteristics of the season should be obtained from the pupils by questions upon their own observation. The total experience of the class on the subject should then be collected, and repeated in a connected narrative by the teacher, who will supplement the information thus elicited by fuller details. As each season comes round and exhibits some of its more typical features, these should be brought to the notice of the scholars in passing—winter with its short days, its snow and frost and storms; spring with the coming of bud and blossom, and the voice of birds; summer with its wealth of leafage and flowers, and hum of insect-life; autumn, with its golden foliage and mellow fruit, and then the fall of the leaf as winter once more approaches.

Coming back at the close of the elementary stage upon the subject of these lessons in which ideas of time are gradually expanded, the teacher will direct the thoughts of his scholars to the way in which the various subdivisions succeed each other in endless repetition. Day follows day,

week comes after week, month after month, season after season, and year after year. The same ceaseless succession has continued all through the past, and will no doubt continue in the future. The connection of this repetition with the sun's course in the heavens will once more be dwelt upon, and then the teacher may begin to unfold to the children the real meaning of day and night. In the simplest way, and with the aid of every suitable appliance, he will gradually make them realise that the earth is a ball rotating on its axis once every twenty-four hours. The cause of day and night already partially apprehended can now be made clear and intelligible. So important is this fundamental conception of the earth's form that no further step should be taken until it has been completely grasped by the class.

The next acquisition must be a thorough comprehension of the idea that not only does the earth spin round on its axis, but that it revolves round the sun. To plant this idea firmly in the young minds is worth much thought and labour. The lesson must first be impressed with model and diagram, and afterwards expanded by observations out-of-doors.

The path of the shadow of the post in the playground, or of the gnomon of the sun-dial, must now again be carefully watched, not to trace its progress from hour to hour, but to observe how it lengthens from day to day during one part of the year, and shortens during another part. In the course of the previous observations the teacher should have taken care that the length of the shadow at noon and its limit at certain hours of the day were accurately recorded for some particular day, so that when returning to the subject weeks or months afterwards he can refer the class to these previous measurements, and compare them with the subsequent places of the shadow at the same hours. He should particularly record the length of the shadow at midsummer and at midwinter. The position of the sun in the sky at different times in the year should also be noted, and it should be shown that at each time of the year the shadow always returns to the place it had at the same date the

previous year. The object of all these observations is to impress on the minds of the pupils by the evidence of their senses that the earth revolves round the sun, and that what we call a year is the time taken to complete a single revolution.

CHAPTER VII

THE SURROUNDINGS OF SCHOOL—OUT-OF-DOOR TEACHING

I HAVE already pointed out the great benefit derivable from excursions beyond the school bounds, and I now propose to enter into some detail regarding the conduct of such excursions. So important is this co-operation of teacher and taught in the open air, face to face with the objects of the lessons, that in my opinion nothing but the most insuperable obstacles should be allowed to prevent it. But where it is found to be absolutely impossible, the teacher should endeavour to minimise the loss by insisting that his scholars shall themselves take the walks, and then by questioning them upon them, gathering together what they have seen and pointing out what they may have failed to see. A pleasant way of doing this is to conduct the lesson as an imaginary walk, and to call for observation and remark just as if the scholars were on the ground.

In dealing with the subject, however, I will assume that the difficulties have been overcome, and that excursions can be organised as part of the work of the school. In planning them, the teacher should start with a definite idea of what he wants to attain from them. If his object is merely to obtain fresh air and relaxation with his pupils, no very methodical arrangement of details may be needed. But if he wishes not only to enjoy the fresh air and relaxation, but to make the walks really a discipline for the young, he will take the trouble to think out a scheme of the chief subjects to which he proposes to direct attention, of the way in which each of them should be treated,

and of illustrations that would be serviceable in explanation of them. Of course he will also be ready to take advantage of any incident that may occur in the course of the walk, and make it subservient to his main purpose of education. Thus without appearing too artificial or methodical, he will come definitely prepared for the task he has undertaken.

Reference has been made to the practical difficulty of conducting class excursions. The age at which pupils may usefully attend them must be judged by the teacher. He should begin with small parties not exceeding eight or ten of the older pupils, and accustom them to the discipline required for the excursions. By degrees as they gain experience, these older pupils can be utilised as aids, each with the charge of four or five of the younger children, keeping them in their places, and preserving due order, while the master himself moves from one end of the party to the other and with his eye over all. The numbers should never be so large that with the assistance of a few elder scholars the whole cannot be kept well in hand.

The objects of the excursions are to train the pupils in habits of observation and reflection, to teach them the elements of topography, to enlarge their capacity for the comprehension of geography, and generally to stimulate their love of Nature. Before these objects are attained, however, a good deal of useful preliminary work may be done. What the pupils have already themselves observed should be drawn from them by appropriate questioning. Thus the routes to school, some of which must necessarily be traversed in the excursions, should form the subject of close examination. A particular route, say a line of road or street, should be selected, and the pupils who follow it in coming to school should be asked to describe what is passed by the way, on the right side and on the left, the prominent buildings, cross-streets, and other landmarks being specially noted. Each in turn should be asked to name the next object after that last mentioned, and if he omits one of prominence, the teacher before calling on the

next pupil should ask the class if anything has been omitted. The other routes may be similarly treated, and thus before a formal excursion has been held, the results of the observations already made by the children will have been collected. It will give additional vivacity to these lessons, if, as the information is elicited, the teacher will trace the route on the blackboard, adding object after object as it is announced by the pupils. His drawing will thus be like one of those already referred to, but will have reference rather to the details of the route than to its direction.

It is obvious that while no precise rules for the arrangement of excursions can be laid down, each locality having its own peculiar fitness or unfitness, some broad general principles can be formulated which are capable of application no matter what may be the local circumstances. In succeeding chapters I propose to show how the local physical geography, natural history, and other features may be made of use for purposes of instruction. In the meantime let me here refer again to a fundamental difference of conditions by which teachers are affected—that between town and country. The teacher in a large town is undoubtedly placed in a position of disadvantage so far as regards excursions with his pupils. But he is far from destitute of materials which can be turned to good account.

Let us, for example, suppose the school to stand in a densely-crowded district, where no walk can be taken save through a succession of noisy streets. A more unfavourable situation for a profitable excursion could hardly be imagined. Obviously the natural objects which would form the chief themes for observation and remark in a country ramble are here absent, and their place must be supplied by a totally different series. Previous to the excursion, an outline should be given by the teacher of the kind of things to be looked for and noted. It will of course be understood that in the earliest excursions with young scholars only the very simplest matters should be dealt with, such as lie open to the most cursory observation, and can be readily appreciated even by the least advanced of the class. Whatever the

children might themselves take note of may be appropriately selected. It is hardly possible at first to be too infantile in the choice of topics for remark. The great point to be aimed at is to arouse the attention and to quicken the observation of the pupils. And the more simply and naturally this can be done, the more effective will be the teaching.

But after such preliminary trials, the teacher will doubtless soon be able to feel his way towards more advanced and methodical work, and a much larger choice of subjects. He may, for instance, speak of various materials used in the construction of houses and streets, pointing out in general terms their nature and source, such as the stones of the pavements, the bricks of the walls, the slates or tiles of the roofs, the ornamental granites, marbles, and other stones employed for decoration, the metals in most frequent use, and the purposes for which each is fitted. Then he may with the help of diagrams explain some of the more marked differences in the styles of building in the district. The construction of the arch, for instance, columns, buttresses, roofs, the broad distinctions between Gothic and classical architecture, and other allied subjects that can be readily appreciated and tested by actual examples, will furnish abundant material for interesting instruction. Some preliminary observations may be made about trade and commerce, how some things are produced in this country, and others are brought from abroad, how most natural products undergo some process of manufacture before they are fit for use, and hence how the various industries of life are developed; how as civilisation advances new wants arise that start new developments of trade; and how in this manner commerce grows and nations all over the world are brought into intercourse with each other. Any facts of historical interest about the locality should be pleasantly told, and more particularly if there remain any building or other memorial of past events, which can be pointed out in the course of the walk. Even the names of the streets and squares through which the walk is taken

may sometimes be made to yield their contribution of interesting local detail.

Having thus prepared the minds of the pupils for looking intelligently at what they are to see, the teacher, during the walk, will point out examples and illustrations of what he has told them, amplifying the previous allusions by that fuller detail which is so much more easily grasped and understood face to face with the actual objects. A prominent feature in the earlier excursions, and one to which he will often recur at later stages of instruction, is the practice of correct orientation, to which I have already referred. Constant and varied exercises in this subject should be carried on until the cardinal points are well known in all parts of the school district, the directions of the streets, and the relative positions of public buildings.

Undoubtedly a formidable difficulty in these open-air lessons is presented by the multiplicity of objects that claim attention in the thoroughfares of a populous city. I have suggested one means of lessening this difficulty—viz. by directing attention beforehand to the kind of things to be looked at, so as to limit as far as possible the field of observation. But great assistance in the same direction may also be found in the practice of classification. Take by way of illustration the shops of a busy street. These usually succeed each other with little or no order of connection, and the impression they naturally make is one of hap-hazard association or confusion. But if the classifying instinct is allowed to deal with them, a simple principle of arrangement may be found which will introduce connections between them previously unthought of by the pupils, and will give a fresh and unexpected interest to the subject. Thus the various trades represented may be gathered into groups. One of these will include those that deal with building—masons, bricklayers, carpenters, plumbers, etc.; another those that have to do with food; a third with clothing; a fourth with locomotion and so on. Or the broad distinctions may be insisted on between native and imported articles, raw and manufactured products, or other

obvious and simple grouping, which the intelligence of the children can readily appreciate. The multifarious crowd of objects that press for notice in every large town may thus be reduced to some kind of order, while their relations to each other are revealed, and valuable knowledge is gained concerning the arrangements of our social system.

But even when in populous city pent, the teacher must not be supposed to live wholly deprived of illustrations of the face of Nature. The sky, at least save when a pall of smoke-fog hides it, stretches overhead with its lessons touching the forms and growth of clouds, the fall of rain, hail, and snow, the effects of winds and storms, and those simple aspects of meteorology which are of universal interest. As the pupils advance in their acquirements, they may be led to watch the movements of the thermometer and barometer, and to connect them with changes of weather.

Again, even in cities built upon plains or in broad river-valleys, there will usually be found sufficient inequality of level to furnish illustrations of the flow of water over the land. A sudden shower will turn every gutter into the channel of a stream, and as these artificial rivulets flow along the streets they may serve to exemplify the drainage of a whole country. The highest levels may thus be ascertained, and lines of watershed may be traced even across the streets of a town.

Nor as a rule are illustrations wanting of the great types of the vegetable and animal kingdoms. Indeed, in some respects, the town teacher has special advantages when he treats of these subjects. The squares and public gardens will generally supply him with living examples of some at least of the leading forms of plant-life, and he may be able occasionally to add to these from the resources of private greenhouses—though nothing can wholly compensate for the want of the green fields and dells of the country. A museum of natural history is a storehouse of the most profitable and interesting instruction. A collection of antiquities and of ethnology may likewise be made of great service for purposes of geographical education. If, then,

even in a large city opportunities may be found for the practical training of the young in habits of observation and reflection, it will be obvious that in smaller towns where, besides the advantages of town life, opportunities are afforded for easily reaching the sights and sounds of the open country, the circumstances are peculiarly favourable for the effective teaching of geography.

To some of the special facilities presented by country surroundings I shall now refer. The changes of the sky and the atmosphere lie, on the whole, more open to daily observation in the country than in town, and may be proportionately made more effective use of for purposes of instruction. The children usually come from longer distances, and are more exposed to the weather; the air is clearer, and the expanse of firmament wider. Sunrise and sunset can be watched, and those of one day can be compared or contrasted with those of previous days. The starry sky, undimmed by town fog and the contending glare of street lamps, bends overhead and fills the young imagination with wonder. The changes of the moon are familiar from infancy; boys and girls soon come to realise the importance of the time of full moon in the evening arrangements of country life. But how many town-bred children know anything about the moon? to them her pale mild beams are lost in a flare of blazing gas.

In the country, the natural surface of the land, unburied below an expanse of streets and houses and the accumulated rubbish of centuries, offers illustrations of many of the fundamental conceptions of geography. Its various undulations and inequalities, ridges and hollows, hills and valleys, afford types of the configuration of the general surface of the globe. Its lines of watershed, its runnels and brooks, its ponds and lakes, supply examples of the circulation of water over that surface. Then its meadows and woodlands, its heaths and downs, its wild flowers, hedgerows and forest trees, furnish living samples of the vegetation that clothes the land with verdure, while among its insects, birds and wild animals, illustrations may be found of the great types of invertebrate and vertebrate life. Nor are human

associations wanting. The gray cairn, the lichened monolith or prostrate cromlech, the ruined castle, tower, or abbey, serve as vivid memorials of olden times. The influence of man upon the face of Nature can be readily seen and understood in a landscape where the operations of agriculture have been the chief causes of change.

A teacher placed in the midst of these country surroundings has the opportunity of giving his pupils an admirable training. But how few of our teachers so situated are aware of their advantages, or have been trained to make use of them! Even in schools otherwise excellently conducted, and supplied with the best modern appliances for teaching, this fatal neglect of their country environment may be observed. I may refer by way of illustration to the case of a school with which I am acquainted. It is situated on a rocky coast, teeming with all kinds of natural history interest, while ranges of bare downs and tracts of woodland stretch for miles into the interior. A locality more admirably fitted for practical geographical instruction could hardly be chosen. The boys cannot walk in any direction without meeting with abundant material to call forth their powers of observation and deduction. But not the smallest endeavour is made to point out anything in Nature to them. The geography lessons are mere formal tasks confined to the dry pages of the authorised class-books, as if the school stood in the heart of a city, and the face of Nature were hidden out of sight. Some natural indignation is surely pardonable when one sees such priceless opportunities so thoughtlessly ignored. A country schoolmaster has his special responsibilities, and among these by no means the least pressing is that he shall do his best to ensure that the advantages of his position are made the fullest use of for the benefit of his pupils.

In country excursions, it is hardly possible to follow the same route twice under precisely the same conditions. The aspect of the sky changes, the weather varies, the positions of light and shadow differ even from hour to hour and day to day, while as season succeeds to season more marked

alterations in the landscape arrest attention. These transformations furnish inexhaustible subjects for accurate observation and comparison, while the explanation of them supplies admirable material for showing the relations of cause and effect, and for training the mind to habits of accurate induction.

With regard to all excursions, whether made in town or country, careful revision is much to be desired. The excursion should form the subject of a special lesson in school. By appropriate questioning, the teacher should build up from the answers of his pupils a statement of the experience gained. This statement, for his own guidance, he ought to write down. Before the next excursion by the same route, a summary of the acquired knowledge should be obtained by questioning, and to this summary will afterwards be added the information obtained in subsequent rambles so that each step of the progress made in the exploration of the district may be distinctly perceived.

The rough maps of the routes drawn on the blackboard for the earlier excursions should be improved in correctness and in detail as the class advances. But accuracy of topography is not to be aimed at until considerable progress has been made, and the pupils have learnt to use some surveying instruments. The paramount object is to get their eyes accustomed to the delineation of topographical features, and to the comprehension of a map as a representation of a portion of the surface of the earth.

The local topography must be thoroughly mastered. As I have already insisted, the cardinal points as determined at school must be fixed during the excursions by reference to the sun's position. From the school as a centre, all the places lying north, south, east, and west of it should have their relative situations determined. The pupils should be constantly exercised in pointing out the quarters of the heavens, and in ascertaining the directions of objects in the surrounding landscape. When the four cardinal points are completely understood and remembered, the divisions into N.W., N.E., S.W., S.E., and still smaller subdivisions

may be learnt. The pupils should make for themselves such circular cards as are used in the mariner's compass, and carry them during the excursions. The teacher will fix his card on the end of a stick thrust into the ground, or place it on a wall or other stationary object, and adjust it so that its N. point shall look due north. The scholars doing the same will then read off the direction of every feature in the landscape.

CHAPTER VIII

PHYSICAL GEOGRAPHY OF THE SCHOOL LOCALITY

AN observant teacher will not fail to notice that, long before children can understand or take any intelligent interest in the geography lesson as ordinarily given in our schools, they are quite alive to the attractions of that large mass of phenomena embraced within the scope of what is called Physical Geography. They at first care little about the political boundaries or subdivisions of countries; but if you speak to them of the changes of the sky, the movements of the wind, the fall of rain, the nature of snow and frost, or of rivers, lakes, and glaciers, of waves and storms, of the soil and the plants that grow on it, of insects and birds and familiar quadrupeds, in short, of the outer world which they see around them from day to day, their attention is at once arrested. The subject is one that comes within the range of their own observation. And in education, the importance of connecting the subject of instruction with the personal experience of the pupils can hardly be over-estimated. The objects and changes of everyday life which serve as the earliest lessons of infancy may profitably be made use of in the discipline of school. In the mode of treating them regard may obviously be had to the tenderest capacity. On the other hand, when the tuition has become more detailed and advanced, the same subjects still afford endless opportunity for illustration. I will offer some suggestions as to the way in which local surroundings may be made serviceable in enforcing the elements of physical geography.

1. *Forms of Surface; Soils and Rocks.*

As the school district constitutes the basis from which, as far as possible, the pupils are to realise what the world is as a whole, early attention should be given to its natural features. Among these the configuration of the ground should claim special notice. In flat regions, it must obviously be less easy to find practical exemplifications of this branch of the subject; though even there, observation of the flow of water will reveal differences of level, and determine the highest and lowest ground. But where the district presents considerable diversity of outline, it furnishes admirable material for the practical illustration of some of the fundamental facts in physical geography.

At first, only broad and obvious features are to be considered, such as where the ground is highest, lowest, steepest or flattest, where opposite slopes meet, as in the crest of a ridge or the bottom of a valley, or where streams flow in opposite directions. Such facts as these can be recognised and appreciated even by young scholars. They should first be described from the previous local knowledge of the class, and should then be confirmed by an actual examination of the examples on the ground. Ridges, slopes, valleys, ravines, plains, crags, cliffs, and all the other prominent features in the landscape, are where possible to be recognised and afterwards described by the pupils from their own observation. In successive walks, ridge is to be compared with ridge, valley with valley, until by degrees a definite generalised conception of each physical feature is gained.

For the purpose of impressing true conceptions of the relative proportions and significance of the several features in the local topography, two methods of instruction are of signal usefulness. In the first place, any commanding elevation in the district should be visited, after a few excursions have been made and the general form of the ground and the distances of localities from each other have become more or less familiar to the pupils. The want of any natural eminence may sometimes be supplied by a church-tower or

other building. At first, the teacher will find that his scholars have some difficulty in appreciating from a height the relative distances and sizes of the objects in the landscape, even where these are already well known. A little practice is needed before the eye becomes accustomed to take in at a glance so much wider a sweep than is possible on low ground. Hence, at first, spaces look less than they really are. No more admirable training is therefore possible than is gained in the gradual education of the eye to judge in this way of relative proportions. A good "bird's eye view" of a district, where it can be obtained, is worth many maps, models and books to a teacher who knows how to take full advantage of it. Not only early in the geography lessons, but at intervals during their whole course, he will avail himself of it, and will find that each successive visit suggests new impressions to his pupils, and deepens the appreciation of former lessons.

In the second place, as early as may be practicable in the course of instruction, models of the topography of the district should be made in any easily procurable material that will serve the purpose. As already mentioned, moist sand or clay, which are generally to be had, are quite suitable. I would again insist that, at first, accuracy of proportion need not be aimed at. The practice which the pupils may have had in drawing rough maps of the school surroundings will have accustomed them to judge approximately as to the respective distances of objects. At the same time it may be useful once more to allude to the necessity of repressing, as much as possible, the natural tendency in modelling to make the vertical scale greatly larger than the horizontal. Some departure from strict truth is generally necessary, but it should not proceed farther than may be required for conveying a vivid impression of the general disposition of the heights and hollows. The gross exaggeration exhibited in many models and profiles is not merely unnecessary but positively pernicious, inasmuch as it conveys and perpetuates entirely erroneous ideas of the relative significance of the contours of the land.

Let the teacher bear in mind that the object to be aimed at in the employment of modelling in geographical instruction is to impress on the youthful mind the character and relative proportions of the variations in the outer surface of the land. At first, therefore, as in ordinary map-drawing, no more detail should be introduced than is absolutely necessary for the purpose. By excluding the multiplicity of objects which claim notice on the ground itself, and by restricting the attention to what are really the essential features in the configuration of the district, the elements of topography are impressed upon the imagination and the memory with a clearness and vividness hardly attainable in any other way. Gradually as the pupils gain facility in manipulating the sand or clay, and also advance in their recognition of topographical features, greater detail and accuracy of proportion may be required of them. A model of the school district may then be built up on an outline map, the positions and heights of places being marked off with pins, or the method of employing sheets of cardboard cut out along contour-lines may be adopted, in the manner already described. The construction of such models by the more advanced pupils affords an excellent discipline.

When the children have learnt to represent with some approach to accuracy the topographical features of their own district, they may be allowed to model other varieties of surface of which no examples may be found there. But for this purpose they should be provided with diagrams or photographs of the objects or districts to be depicted. Such geographical terms as a hill, a valley, a ravine, a cañon, a cliff, a headland, a bay, a peninsula, a lake, an island, an escarpment, a volcano, a mountain-chain, a tableland, may thus be firmly impressed upon the mind by the representation of actual examples. It is infinitely better to reach in this way the generalised conception of each of these terms than to begin with a definition, which not improbably many of the pupils do not clearly understand, and to work up to it with illustrations.

From the varying configuration of the surface of the

land, the transition is natural to what lies below the surface. Some of the more intelligible and interesting facts about soil, how it is formed and what are its uses, should be presented to the pupils in as simple a manner as possible. During their walks, their attention should be called to any openings, natural or artificial, that may lay bare the soil with its subsoil, and the rocks lying underneath them. The upper layer of humus, with its mantle of living plants that grow on it, and send down their roots freely through it, may easily be examined, and affords an excellent subject for practical teaching. Then the relation of the soil to the subsoil may afterwards be traced; and, lastly, the way in which the subsoil results from the decay of the rocks that lie below it. This subject may be treated in a simple way, so as to be easily apprehended by young scholars. But of course it may also be taken in ample detail, and in connection with the resources of modern chemistry, geology, and physiology. Between these two extremes lie many progressive stages of tuition, which supply an altogether admirable course of discipline.

During the class excursions or in their own walks, the scholars should note the rocks that underlie the surface. I do not imply or suggest that lessons in geology should be given. But there are certain broad features in the structure of the globe which everybody ought to know, and which are not, therefore, properly to be regarded as mere pieces of scientific learning. Among these facts of common knowledge are the few leading varieties of rock that compose most of the framework of the land. To be able to distinguish a piece of granite from a piece of limestone, or a piece of sandstone from a piece of shale, it is not needful to know geology, any more than to recognise an elm, an oak, or a pine, demands an acquaintance with botany. These are pieces of elementary knowledge which every one of ordinary education ought to possess.

The teacher should first make himself familiar with the chief varieties of rocks that occur in his school district. Even if he is at a loss for their correct scientific names, his

teaching may be none the less effective. The great desideratum is that he shall himself be able to discriminate the essential characters of each leading type of material, and to teach his scholars to recognise them also. The local names for the different rocks will then do quite as well as the terms known to geologists and petrographers. At the outset, the broadest view of the subject should be presented to the children. Their attention should be called to the fact that, underneath the surface lie various kinds of materials which are exposed when the superficial cover is removed. The places in the district where these materials can be seen should be successively visited. Perhaps within the limits of the school district only one kind of material may occur, or there may be several. Each kind should be looked at, the teacher taking good care to prevent the attention of the class from being distracted by mere varieties, and to keep it fixed upon essential characters. Suppose, for instance, that the material underlying the district is gravel. It may vary greatly in the size of its pebbles, some of it being made up of stones as large and round as a man's head, other portions being so fine as to pass into mere sand. It may differ much also in the composition of its pebbles; in some places these may be mostly flint, in other places quartz, or slate, or granite, or other hard rock. The pebbles too may vary considerably in shape, being in one locality well rounded like cannon-balls, in another mostly angular, like chips of rock lately broken up. All these differences are of course of interest and importance in the investigation of the geological history of the district, and the advanced pupils should be taught to observe them, and reason out the conclusions to which they may lead. But in the elementary stage such details would be worse than useless; it is enough to recognise that the material is gravel, and that it has more than one variety.

No attempt should for some little time be made to explain the origin of the rocks that are met with, or to suggest that the present aspect of the country is only the

latest in a long succession of geographical changes. Where such a suggestion naturally forces itself to the front, it may be allowed a place in the elementary stage. For instance, the occurrence of beds of gravel high above the present level of a river may be made to furnish simple lessons on the gradual lowering of river-beds, and the excavation of valleys. But in the majority of cases, the evidence for geological revolutions requires an amount of observation and reflection that can hardly be looked for except among advanced pupils.

Great interest is given to the country excursions by the collection of samples of the objects observed. Pits, quarries, road-cuttings, and other artificial openings, afford access to the rocks below the surface; but still better natural exposures may be found in water-courses, lines of escarpment, bare hillsides, or strips of rocky coast-line. The pupils, having learnt to recognise the leading types of rock, may gather chips of them, not necessarily for preservation, but to accustom the eye to judge of their characters. The teacher should take care that the school museum contains good typical specimens of the rocks of the district, and that these are shown to, and examined by the pupils before the excursions. If a pupil finds a better example than any in the museum, he should be induced to place it in that collection. The scholars should be encouraged to take a pride in making the museum as complete and illustrative as possible for educational purposes.

2. *Atmospheric Changes.*

A knowledge of the great movements of the air we breathe and of the general laws that govern these movements, ought obviously to form an elementary part of any liberal education. The subject has attractions for old and young, since it includes a consideration of many of the most familiar occurrences of every-day life. Variations of weather, changes of temperature and moisture, the gathering of clouds, the rise of winds and storms—these and many other phenomena, which have fixed our attention from infancy, ought not

to be the objects of mere gaping wonder. They should be intelligently appreciated, and the due comprehension of them should be begun during the early years of school-life.

The simpler parts of this subject lend themselves in a peculiarly attractive way to practical teaching. The air is always around us, and many of its changes can be watched from hour to hour. These changes, moreover, are susceptible of accurate measurement, and the instruments by which the measurement is made are simple and easily obtainable. Thus not only can habits of observation be cultivated, but practice is afforded in accuracy and precision. The advantages of the country schoolmaster over his town colleague in great measure disappear in this branch of instruction.

Those aspects of the subject should first be chosen which are easiest of comprehension, or which are most familiar and prominent in the experience of the scholars. Differences in temperature, for example, from which such stupendous meteorological consequences follow, can be made intelligible and interesting in a practical way. Every pupil is sensible of the difference between the heat of noon and the cool of night, between summer and winter, between direct sunshine and a cloudy sky. But it requires some little experience and reflection to realise how defective and even misleading is the testimony of the senses as a measure of the amount of these differences. The familiar experiment of placing one hand in warm and the other in cold water, and then immersing both in the same basin of tepid water, is most instructive. The different impressions conveyed to the mind by the two hands as to the temperature of the tepid water necessitate a little repetition and explanation; but when the meaning of the experiment is understood, the children readily perceive how desirable it must be to have some better standard of measurement for heat and cold than the mere sense of touch affords. The way is thus opened for an account of the use of the thermometer.

In dealing with younger classes it is not necessary or even desirable to enter at first upon the theory of the instrument. Children can at once observe that the mercury

or coloured alcohol rises and falls, and it is not difficult to make them comprehend that the one movement depends upon an increase and the other upon a diminution of heat. A thermometer with bold, easily-legible scale ought to be suspended in every schoolroom. Experiments, varied in different ways, should be made with it to determine temperatures, until the pupils understand the working of the instrument, and have become familiar with the method of expressing known temperatures in degrees of the thermometer scale. For example, the temperature of different parts of the school-buildings should be taken; the temperature indoors should be compared with that out of doors, that of sunshine with that of shadow, of morning with noon and afternoon, likewise of one day, or week, or season with another.

The school thermometer should be read, and the reading may advantageously be recorded at least once a day, and regularly at the same hour. This should be done by the pupils themselves. Observations of this kind give them a clear conception of the constant variations in the temperature of the air, while at the same time they inculcate habits of accuracy in dealing with natural phenomena. Moreover, they are in themselves so simple and so interesting that they well deserve the teacher's attention. When they have become familiar to the pupils, they may go on as part of the regular work of the school and without practically encroaching on the time devoted to other subjects. The most meritorious pupil may be entrusted with the duty of taking the thermometer reading for the day, and thus a task which becomes a mark of distinction is sure to be sought after.

When in a later stage of instruction the teacher comes to deal with those great questions in physical geography, where the influence of temperature plays so prominent a part, he will find the advantage of having laid a solid foundation of knowledge by educating his scholars in the use of the thermometer. It is not merely that this practical tuition enables them to realise better the nature and

extent of the changes of temperature in the air. They acquire the habit of testing the evidence of the senses by actual instrumental measurement; they recognise the absolute necessity of such measurement in all investigations of the atmosphere, and they appreciate on what a sound basis researches into the causes of variations in weather and climate can now be conducted.

The subject of atmospheric pressure in relation to meteorological changes is too difficult to admit of adequate treatment in the elementary stage. It should be left for full exposition to more advanced pupils. But while the phenomena are allowed to remain for future explanation, they may well be made in the meantime the subject of direct observation. For this end, attention should be directed to variations in the weather, and to the general coincidence between them and movements of the barometer. A good mercurial barometer should, if possible, form part of the educational appliances of the school, and should be placed in a conspicuous position, where its readings can be readily taken. As soon as the children are capable of understanding it, a simple explanation of the instrument should be given to them. Much interest will be added to this explanation if the teacher will tell the story of how Torricelli was led to discover the principle of the barometer, and how Pascal afterwards confirmed and extended the discovery by his ascent of the Puy de Dome.

When the instrument has in this way been connected with some historical and personal associations, the rise and fall of the mercury should be watched, and the mode of reading these movements should be explained. In the end, the same pupil who, as a reward of merit, is entrusted with the task of recording the "readings" of the thermometer, may at the same time take note of those of the barometer. While the full meaning and value of such observations must remain to be expounded at a later stage of progress, the teacher may profitably call the attention of his scholars to any rapid fall of mercury, and to the bad weather which will usually be found to accompany it; also to the coinci-

dence of a steady high barometer with a continuance of fine weather. These relations are readily appreciated, and serve to impress the practical usefulness of the barometer upon the learners.

The phenomena of evaporation and condensation, which take so leading a place among atmospheric changes, afford an excellent subject for effective practical teaching. There are so many familiar illustrations of them that the daily experience of the pupils can be appealed to at every step of progress, while at the same time they call out the observing faculty, and supply impressive examples of cause and effect. Every child, for instance, has noticed, or at least can be made to notice, that after a heavy summer shower the ground speedily dries up and the pools of water disappear. Still more familiar is the fact that wet clothes can soon be dried when hung in front of a fire. From these and numerous other illustrations, which will occur to the teacher, and some of which may be repeated in the class-room, the fact is firmly impressed upon the mind that water passes off into vapour in the atmosphere. A further advance in knowledge is made when the scholars are led to observe that the process of evaporation is accelerated by heat. They know that pavements and roadways dry up more quickly on warm, sunny, and breezy days, than when the sky is cloudy and the air chilly; also in summer than in winter. They know too that the better the fire, the more rapidly will the moisture be driven out of clothes hung in front of it. They may be shown that a kettle full of water can be boiled away entirely into vapour. Proceeding upon this basis of common experience, the teacher will gradually unfold to them the grand system of evaporation continually going on upon the surface of the earth.

But evaporation is only one half of the complex circulation of water through the atmosphere. Condensation, which forms the other half, can be as effectively brought home to the eyes and minds of the young scholars. And here, as before, their own personal experience should be appealed to. They will, no doubt, have noticed the moisture

that runs down the inside of the window-panes of warm rooms when the air happens to be chilly outside. They know that their breath forms a momentary cloud as they walk along on a cold day. They may have observed the film of dew that gathers on the outside of a glass of cold water that is brought into a warm sitting-room. From such familiar illustrations, it is not difficult to lead them onward to just conceptions regarding the formation of dew, and clouds, and rain. Gradually the idea of the marvellous circulation of water between the earth and the atmosphere unfolds itself to their young minds, and gives them one of their earliest and most memorable impressions of the grandeur and harmonious working of the great laws of nature. It will be the aim of the teacher to deepen this impression by widening the experience of his scholars, and leading them to perceive in the familiar facts of their daily life further illustrations of the same great truths.

The forms of clouds, and their relation to conditions of weather, can be made an interesting and instructive subject in elementary teaching. Thus the fine filamentary cirrus clouds, which appear at great heights in the air, can be made to tell their story of the movements of the higher layers of the atmosphere. Watched at intervals, they slowly alter their shapes, and afford valuable guides as to the coming weather. Every child can recognise these changes of cloud-forms, and can judge how far the prognostication based upon them comes true. If, for instance, the fine feathery cloudlets look as if they were being brushed away from the south-west towards the north-east, they foretell that within a day or two strong winds from the south-west may be expected. Again the nimbus or rain-cloud can be watched as it approaches, and its characteristic features accurately noted, its formation by the aggregation of masses of cumulo-stratus, the long streaky lines of the descending rain, and the final breaking up of the mass into detached shreds of cloud as the rain ceases.

Where opportunity offers, a rain-gauge may be advantageously constructed, and a register of the rainfall kept,

the actual observations being made and recorded by the pupils themselves.

The difficult subjects of weather and climate can only be lightly touched upon in their simpler aspects, so far as the capacity of the elementary classes will permit. Their proper treatment must obviously be reserved for a more advanced stage of teaching, where, as a mental discipline, they offer peculiar advantages.

3. *Rain, Rivers, Sea.*

From the rainfall, the transition is natural and easy to the flow of water over the land. The part of the rain that runs off in runnels and brooks can readily be followed. Where a stream exists in the school locality it should be made the text for the lessons on the flow of rivers, and the action of running water upon the surface of the land. The teacher should himself first make a careful study of the stream's course with a special view to its capabilities for purposes of instruction. The advantage of recognising the right and left sides of a river will be easily shown. If the stream flows sluggishly on level ground, it may furnish good illustrations of the serpentine course followed by rivers, and of the deposit of sediment. If it descends more rapidly over an uneven district, it will doubtless supply examples of the way in which running water erodes its channels, and perhaps of successive terraces marking former levels of the water. From such a stream, the teacher will have no difficulty in impressing upon his young hearers the truth that rivers have gradually hollowed out the valleys in which they flow. Miniature illustrations of gorges, waterfalls, rapids, lakes, and other features in the course of a river may also be found, and these will serve in a graphic way to bring some of the more striking aspects of river scenery before the imagination of the scholars.

The portion of the rain that sinks underneath the surface is less easily followed. But if there are any springs in the neighbourhood of the school, they may be made an effective means of explaining the underground circulation

of water. They should be revisited at different seasons, more particularly after drought and after heavy rains, when any appreciable variation in the volume of water may be detected, and the relation of the outflow to the rainfall may be enforced.

Should the school be situated near the sea, an inexhaustible field of illustrations may be found along the shore. The phenomenon of the tides, which elsewhere can only be more or less intelligently followed from diagram and description, can here be actually seen every day. Those who have from infancy been familiar with the ebb and flow of the sea, can hardly realise how striking these movements are to one who, knowing them only from description, beholds them for the first time. The teacher, whose pupils are well acquainted with high water and low water upon the shore, should tell them of the Roman soldiers, who, coming to the Channel from the tideless waters of the Mediterranean, saw with astonishment the high tide rise and fill the ships which they had supposed to be safely drawn up on the beach. The coincidence of the tides with the phases of the moon may be alluded to in an elementary geography class at the seaside, but the explanation of the phenomenon is better reserved for a more advanced stage of instruction.

Besides the tides, the formation of waves may be observed at the coast; also their action in wearing away the edge of the land in one part, and heaping up shingle and sand at another. If, during historic times, any marked changes of the coast-line in the school district have occurred, these will of course be described to the pupils; their causes will be explained and it will be further shown whether any similar changes are still in progress. Along some parts of the east coast of England, for example, whole parishes have disappeared under the waves during the last few centuries; and the average rate of waste amounts in some places to the loss of as much as five yards every year. At a few other places on the coast-line, where shingle, sand, and silt have been thrown up from the sea, a breadth of low ground has been added to the land. Any examples of these changes within reach of the school ought to be visited and explained to the pupils.

CHAPTER IX

PHYSICAL GEOGRAPHY OF THE SCHOOL LOCALITY

4. *Local Plants and Animals.*

IN our methods of geographical instruction it has been too much the practice to ignore the biological side of geography. Yet if we think of it, the forms of the land, the nature and distribution of the soils, the variations of climate, the systems of drainage and the other features of the surface of the earth, derive, after all, their chief interest for us from the way in which they determine the conditions under which the living plants and animals of a country exist and flourish. The flora and fauna include so much of what makes the earth habitable and pleasant to man, that the description of them may be regarded as the highest subdivision of geographical narrative which finds its goal or crown in the characteristics and operations of man himself. No description of a region, therefore, and no mode of geographical instruction can be looked upon as complete, which do not bring before us at least the more striking features in the general assemblage of plants and animals.

The teacher of geography has to consider how this object can best be gained. Where it is kept in view at all, the common mode of procedure is to give out a list of names of the more characteristic plants and animals. Sometimes, though rarely, the list is illustrated with a few diagrams; but for the most part, little or nothing is added to the names, and these may or may not be already familiar to the pupils. I do not say that this kind of knowledge is worthless. If the names are remembered, the meaning of them

may perhaps be acquired at a later period. But surely this is not the way in which the subject is best used in the interests of education. There is another and a better way regarding which I wish to make some suggestions.

At the outset, I would once more insist that in this as in other branches of instruction, the teaching must be practical. Begin with the familiar plants and animals of everyday life, and make use of these as the first steps towards a knowledge of the other plants and animals of the country, and of the various floras and faunas of the different regions of the globe. As far as possible acquire the requisite knowledge at first hand, by examination of the objects themselves, and not simply from books. This knowledge may be small in extent, but it should be accurate as far as it goes. Recognising that the living productions of a country cannot be properly appreciated until some acquaintance has been made with their natural history, we must, at the same time, realise that long before such scientific acquirement is possible on the part of our young pupils, a broad basis of sound fundamental knowledge of the subject may be gained by them. It is this platform of elementary fact which the teacher will try to build up in the young minds, as the groundwork for fuller knowledge afterwards.

In the prosecution of this aim, we have to keep before us the necessity of presenting to the learners a clear, memorable, and, as far as possible, vivid picture of each plant and animal brought under their notice. We should make them see for themselves some at least of the leading characters in which it resembles or differs from other organisms. If it can be actually seen and handled, we should take care that they become personally acquainted with it; otherwise it should be illustrated by a good diagram, so that they will recognise it when they meet with it. We should be able to tell them of its habits or instincts, its place of abode, its distribution, its usefulness or hurtfulness to man. In short, we should endeavour to ensure that, at least some few plants and animals are made thoroughly

familiar to the young, as types from which a more extended knowledge may afterwards be reached.

To the taught, success in this task brings incredible benefit. We stimulate their habits of observation and reflection; we rouse in them an intelligent interest in the phenomena of life; we awaken in them a sense of reverence and sympathy for all living things; and we open up to them glimpses of the infinite variety and beauty, the marvellous adaptations, and the orderly plan of the vegetable and animal worlds.

To the teacher, the task will become one of the most interesting parts of his work. Let him not for a moment suppose that he need be a botanist and zoologist to be able adequately to fulfil it. The acquirement demanded of him is not greater than every intelligent member of the community ought to possess. The main essential is that he should himself make acquaintance with the objects which he brings under the notice of his pupils, that he may describe with the freshness and vividness of personal knowledge, and be able to act as guide in the observations made by those under his charge. Every year he will find his own experience widen and his confidence increase, while at the same time he will note how much more he can see in a familiar plant or animal than he could when he first began to speak about it. His teaching will be entirely untechnical and unsystematic, but though necessarily fragmentary, it should be sound as far as it goes. It should involve nothing to be unlearnt afterwards, but on the contrary should provide a solid foundation of elementary knowledge on which any future superstructure of scientific acquirement may be securely built. Above all, as far as may be, it should excite a desire for the attainment of further knowledge on the part of the pupils.

This teaching may be given in a twofold way. It will, of course, form a part of the geography lesson in the classroom, with every available assistance from diagrams and specimens. But much of it may be imparted less formally, in conversation during the intervals between lessons or

during the excursions. The subject is one in which the personal experience of the pupils counts for so much, that every opportunity should be seized of pointing out to them in what direction observations may be made. The knowledge they have acquired serves as the starting-point for the acquisition of more. Thus where no walks with them are possible, their own personal acquaintance with Nature may still be used as a basis for practical teaching.

But where excursions can be taken into the country, the most favourable conditions are presented for the teaching of this subject. There the natural history objects crowd upon each other, and offer themselves for appropriate comment in their native places. Nevertheless even in large towns many facilities are still afforded to the teacher. Museums and gardens, botanical or zoological, supply ample material for illustration. Whether out of doors or in the class-room, the teaching, as I would reiterate once more, must be from the first practical. The objects themselves, or where that is impossible, life-like representations of them should be seen. No mere name, whether of plant or animal, should be allowed to remain in the youthful mind without some definite conception of the object to which it is applied.

It is evident that towards the cultivation of so wide a field of instruction nothing more than mere general principles can be laid down for the guidance of the teacher. His own individual tastes and training must serve to pilot him among the details. But I venture to offer the following remarks for his consideration, chiefly by way of suggestion, and in further illustration of the leading aims, which, it seems to me, he should keep steadily before him.

1. In the first place, let me repeat the recommendation that the earliest lessons on plants and animals should be taken from those forms which are already familiar, and should be based upon the actual organisms, not on mere diagrams of them. Not only should illustrations be gathered from the local flora and fauna, but from among the commonest objects there. Regarding many of these, a certain amount

of knowledge will no doubt have been already acquired by the pupils, which the teacher will elicit by proper questioning, and test by reference to the organisms themselves. Each further step will be made by direct observation, until a tolerably clear general conception of each object has been gained. It will not be feasible to carry on this system of practical teaching as the range of subject widens. But a great gain will have been made in securing that the first steps of the progress have been taken upon actual personal knowledge.

Towards the attainment of this end, it is desirable to encourage children to gather some of the easily procurable objects on which lessons are intended to be given. In the country, the wild flowers of the district make an excellent subject to begin upon. In towns, garden flowers together with common trees and shrubs are always available. The popular names of the plants should be learnt. Characteristic leaves, flowers, fruit, and seeds can usually be obtained, and offer good opportunities for effective teaching. The more prominent animals in the local fauna should, in like manner, be recognised and known by name; such, for instance, as the commoner insects and birds. The wild animals can best be observed in the country, but even in towns, rats, mice, sparrows, rooks, and some others serve to represent them. The domesticated animals,—sheep, cattle, horses, dogs, and cats serve effectively as types of large groups in the animal kingdom.

Every encouragement is to be given to the children to make out for themselves the leading characters of each object brought to their notice. They should be induced to compare and contrast each organism, and to recognise analogies and diversities of form. The part of the teacher in these lessons ought to be mainly to suggest the line of observation to be pursued, and to guide his pupils in their progress along the line so indicated. If he can arouse in their minds the desire for the discovery of truth, the chief part of his task in this department of his work will be accomplished. Nothing will contribute more to this result

than the first revelation of the unsuspected beauty of detail, that characterises even the most familiar plants and animals. Most boys and girls are deeply impressed when they find out how exquisite is the workmanship even of the common insects and weeds of the wayside. The teacher will do well to deepen this impression in every possible way. He will soon perceive that one of the most efficacious means of so doing, is to allow the object to be examined under a strong magnifying power. A few lenses for the use of the pupils should form part of the equipment of every school. And if to these a microscope can be added, the teacher is provided with one of the most potent aids in his work. I shall never forget the revelation that the sight of the eye of a common house-fly under the microscope was to myself in childhood. The feeling of wonderment that there should be such exquisite beauty in a creature that I had been accustomed to dislike and to persecute, seemed at once to place the outer world in a new relation to me. There came with it, I remember, a revulsion against boyish cruelty to animals. The same experience must be common. A boy who has seen with a kind of awe the marvellous symmetry and minuteness of finish in the very humblest plants and animals has his sense of reverence most potently appealed to.

It is rather by such exhibitions of the beauty and mechanism of living things, than by any formal or systematic lessons that I would begin to influence the tastes and pursuits of children, and prepare the way for the understanding of so much natural history as is requisite for an intelligent comprehension of the flora and fauna of a country, and the leading facts of geographical distribution. I would repeat that much of the kind of knowledge which it is desirable that they should acquire may be communicated to the pupils apart from the ordinary work of the class. Once started on the right track they will rapidly gain it for themselves by actual contact with Nature, and all they will then need will be such direction and encouragement as the teacher may find opportunity to give them.

2. When the interest of the pupils has been thoroughly aroused in the subject, they should be insensibly led to consider some of the leading structures and types of organisation in the vegetable and animal kingdoms. Of morphology by name they will know nothing, yet they will all the while be learning fundamental facts and principles in that department of knowledge. Plants are more especially suitable for practical demonstration. One of the commonest weeds or wild flowers may be chosen, of which the children can readily provide themselves with specimens. Beginning at the roots, its main parts should be successively examined and named. A diagram of the plant may, with advantage, be at the same time traced step by step on the blackboard.[1] The lesson should be repeated with the same and then with other kinds of plants. By degrees, as the knowledge of the pupils grows, comparisons may be made of the diversities of the same part in different varieties of vegetation. For instance, the endless variations in the forms of leaves afford excellent material for illustration. So too with flowers and seeds. These examples can be sought out by the pupils themselves, and the practice of collecting them will serve to impress on the mind the persistence of the same idea or plan in nature, through an almost infinite series of modifications. The minutiæ of vegetable organisation cannot of course be treated of in these early lessons. But an intelligent comprehension of some of the great types of structure in the plant-world may be gained by practical familiarity with the plants themselves. The flowerless division of the vegetable kingdom, for example, may be exemplified by specimens of mould, fungus, liverwort, moss, and fern. The flowering plants afford endless illustrations, each district offering its own examples either in wild or cultivated vegetation. The presentation of such broad views of the plant-world is all that should, for a time, be aimed at. It will open up a perennial source of innocent pleasure to the young, and will pave the way for an appreciation of those

[1] Oliver's *Elementary Lessons in Botany* will be found a useful aid in this teaching.

geographical questions which deal with the vegetable kingdom and its distribution over the globe.

In the animal kingdom also, elementary conceptions of different types of structure may be gained even by young children in lessons of a similar practical kind. It is evident, however, that, for purposes of general instruction, the same freedom in the choice of subjects for illustration cannot be followed as in dealing with plants. Everything naturally repulsive to young eyes and imaginations is to be avoided; the object of the geographical master being not to teach zoology, but to impart such elementary ideas of animal forms as will enable his pupils to follow with profit what he has to tell them about the animals of their own, and of other countries. He wishes to interest them in the subject by opening out to them glimpses of the wonders of the animal world. To succeed in this, he will begin with those classes and orders which are best illustrated in the fauna of the school district, and which can be most easily and profitably examined by the pupils. Any kind of dissection which is likely to test their sensitiveness had better be postponed, until some familiarity with the subject has been gained. It is easy to find examples where this danger is reduced to a minimum. And it should never be forgotten that the knowledge of a few animal types, gained from the examination of actual specimens, is of infinitely more value as a mental discipline, than a general acquaintance with systematic zoology, acquired merely from a class-book.

A school placed near the sea-shore enjoys exceptional advantages for instruction in animal morphology. Every tide casts up illustrations, and the beach forms an exhaustless text-book from which the teacher may draw lessons suitable for every stage in the progress of his pupils. But where these advantages are absent, there will still be found good materials for practical instruction among the most familiar living things. Some of the commonest insects, for example, may be made the groundwork of sound and interesting lessons. Thus, a house-fly, grasshopper, dragon-

fly, wasp, beetle, and butterfly, will furnish opportunity for showing the similarity and diversity of plan in the great class of Insects. The several main parts of each insect should be carefully separated, and, as before, a diagram or scheme of the whole structure should be drawn upon the blackboard. It is hardly necessary to trouble the young learners with the scientific designations of the separate organs, especially where popular names are available. Thus we should speak of the "feelers" rather than the "antennæ," of the "body-rings" or "joints" rather than the "segments" or "somites," of the "wing-cases" rather than the "elytra." Further progress may be made by tracing the same fundamental plan of structure in other articulate animals, which at first seem entirely divergent from insects—such, for instance, as the lobster, crab, and sandhopper. The lens and microscope come in as admirable aids in enforcing these lessons. The varieties of structure, for example, in the eyes, the mouths, the feet, the wings, and other easily-observed organs of different insects, when seen under a strong magnifying power, vividly impress the minds of the young. Some of the simpler and minuter forms of animal life may likewise be exhibited under the microscope, such, for instance, as can readily be observed darting to and fro in the water wherein cut flowers have been standing for some days, or in any organic solution which is allowed to remain long enough exposed to the air.

Vertebrate animals offer many opportunities for interesting and instructive exposition, though they can obviously be treated of only in the simplest and most rudimentary way in the elementary stages of education. So widely do they depart from each other in external form that a common ground of comparison does not at first appear to exist among them. The great generalisation that connects them all together as manifestations of one plan of organisation, cannot be reached until after a patient gathering of facts. But it is well worthy of being sedulously tracked through such familiar illustrations as can be found. Thus

a sample of a fish, a frog, a lizard, a bird, and a mammal, can usually be procured and exhibited to show the characters of the great vertebrate types. By help of comparative diagrams the main resemblances and differences of structure can be made clear. Without entering into too technical details, it is not difficult to ensure that even the younger learners perceive how the same fundamental plan of structure runs through all these types; how a fish, a reptile, a bird, and a mammal, resemble each other, though outwardly so unlike. The central truth, that these are all back-boned animals, connects them together in a clear and memorable way, and links our own bodies with theirs in the great series of vertebrate existence.

Around this fundamental conception, secondary facts will naturally group themselves. Thus some of the more striking homologies of structure cannot fail to rivet the attention. To learn that the breast (pectoral) fins in fishes, the wings in birds, the forelimbs in quadrupeds, and the arms in man, are all modifications of the same parts of the vertebrate skeleton, brings home to the imagination the wonderful unity and diversity of the vertebrate type of structure.

Where possible, actual specimens of the objects should be seen; but in any case there should be plenty of good diagrams of them. A few articulated skeletons are invaluable for teaching purposes. They should be of common animals, such, for instance, as a cod, a domestic fowl, and a cat or dog. The teeth and some of the more prominent bones of the sheep, ox, horse, and other familiar animals, may be collected for purposes of comparison with those of the mounted skeleton, that their place in the framework of the respective animals, and their special peculiarities of form may be appreciated. A good series of teeth is particularly serviceable in furnishing illustrations of certain of the more important characters of the different groups of the higher vertebrates. The bones of birds may be profitably compared and contrasted with those of ruminants and carnivores, as examples of modifications of type for adaptation to special functions.

Thus, by a series of impressive presentations of leading characteristics in the structure of animals, rather than by any attempt at systematic instruction, the teacher will be able to open up broad views of the animal kingdom, increasing the knowledge of his pupils, and furnishing them with the stimulus for observation and reflection, which is supplied by actual contact and familiarity with the objects themselves. From the animals of everyday experience, he will lead them to the consideration of those which, though natives of the country, are less frequently to be seen, and then outward to those of other countries. The oxen of home will serve as types of the bisons and buffaloes of other lands; the dog will help to show what wolves and foxes and jackals are; the cat will explain the essential features of lions, tigers, and leopards. Good diagrams of all these animals ought to form part of the ordinary teaching appliances of every school. And, of course, where a zoological garden or museum exists, it should be made good use of for educational purposes.

3. For the sake of logical sequence, I have placed the consideration of form before that of function. But in actual practice it will not be always possible, even were it desirable, to separate these two subjects sharply from each other. The examination of the structure of an organ naturally suggests an inquiry into the purpose served by that organ in the living plant or animal. As the teacher discloses this wide department of knowledge to his pupils, he lays the foundation of their acquaintance with Physiology. Yet this will be done in the same simple, untechnical and practical way. The term physiology will remain unmentioned, yet some of the fundamental truths embraced by the term will be thoroughly inculcated.

There can hardly be any branch of knowledge with which it more behoves intelligent living creatures to make early acquaintance, than that which deals with the processes of life. Our well-being, physical, mental, and moral, depends so closely upon the proper conduct of these processes, and we have them so much under our own personal control that

we can hardly begin too soon to learn what they are, and how they should be regulated. Yet familiar as they are in themselves, how dimly are they recognised and understood by most people. How constantly do we see them disordered and neglected, in defiance of the most obvious and elementary laws of health.

While these laws ought to be inculcated in early childhood, they cannot be intelligently obeyed without some knowledge of the structure and functions of the body. In as simple and intelligible language as possible, and by constant appeals to the personal experience of the children, the teacher will make known to them some of the fundamental principles of life and growth. The processes of respiration, circulation and nutrition cannot of course be fully comprehended by them; yet their significance in the living organism may be perceived.

Some of the phenomena of life may be effectively demonstrated by examples that can be watched by the pupils. The growth of a living organism is so familiar to us, that the wonder and mystery of it hardly affects us. To young intelligences, however, everything is fresh, and has more or less of the marvellous in it. They watch with increasing interest the growth of a heap of mould, or the gradual development of the little green plants that spring from moist cress-seed. With but slight assistance from the teacher they can trace, as spring advances, the gradual unfolding of bud and leaf, the opening of the blossom, the growth of the seed-pod out of the flower, and then at last the scattering of the seed. What a wealth of material for observation and reflection lies in that series of changes, and how infinitely may the lessons be varied from the endless diversities of the plant world.

The processes of life and growth in the animal kingdom receive some of their most interesting illustrations from the daily experience of our own human bodies. But this experience may be widened, and the lessons it conveys may be brought still more vividly home to the mind by watching how the processes are carried on among the humbler animals.

Most instructive hours may be passed in this pursuit among the fields and woods of the country. But the dwellers in towns need not be without some of these advantages. The smaller forms of animal life can be reared in confinement, and may be made of good service for the purpose. Insects are especially suitable. Their metamorphoses can be followed stage by stage and afford excellent subjects for close observation. A good example will be found in the case of the common tiger-moth. The black and red hairy caterpillar of this insect is familiar to all country boys and girls. It can easily be reared in a box, by feeding it daily with fresh dock-leaves. In the end, the caterpillar spins its cocoon in a corner of the box and assumes the chrysalis form, and after a time the chrysalis changes to the perfect moth. The common white cabbage-butterfly and the magpie-moth of our gooseberry bushes furnish also good illustrations of the complete series of insect transformations.

The habits of plants and animals afford an exhaustless field for delightful observation, wherein more immediate pleasure can perhaps be obtained with less labour, and which consequently appeals to a wider circle of interest and sympathy. As examples of the habits of plants I may cite the various contrivances by which they maintain themselves in position. Look, for instance, at the network of matted and gnarled roots with which a forest tree anchors itself in the soil and defies the tempest. Contrast with it the way in which the ivy creeping aloft by means of its stray root-like fibres rears its foliage far above the ground, or the honeysuckle mounting up by twining its slender stems round some stronger plant, or the convolvulus threading its slim stalks through the thickest hedges, or the goose-grass keeping its fragile stems in place by their rows of prickles, or the sweet pea clinging by its tendrils to branch and stem. Again consider the various plans by which seeds are deposited or dispersed, as illustrated among the common plants of the wayside or garden, such, for example, as the apple, cherry, gorse, maple, thistle, dandelion, and willow. The carnivor-

ous propensities of the sundews and butterworts are also full of interest.

Animal habits and instincts are copiously described in a voluminous literature, so that the teacher can be at no loss for sources of information on this head. Where possible, however, he will wisely lead his pupils to make their own direct observations. Bees, ants, spiders, and other familiar "insects" at once suggest themselves by way of example. Among birds, abundant material will be met with; likewise among the smaller mammals, such as the mole, rabbit, weasel, squirrel, water-rat, and bat.

Every animal or plant of this or other countries, when first mentioned in the geography lessons, should be exemplified by a diagram, or, where possible by an actual specimen; something should be told of its general aspect, of its distinctive peculiarities, its habits, what it feeds on, where it lives, and whether it is in any way useful or hurtful to man. A distinct cluster of associations should, from the very first, gather round its name in the minds of the young, so that every time the name recurs these associations may be awakened. A mere name with no definite idea attached to it is simply a burden to the memory.

There is one final aspect of the biological side of geography to which I would for a moment refer. This is the way in which the natural history sciences exemplify the necessity and importance of a habit of classification. Children can readily be made to understand the value of classifying what they meet with. Indeed they unconsciously furnish proofs of it by the way in which they instinctively arrange their treasures. A boy who collects stones is usually careful to put the ores in one drawer, the spars in another, the pebbles in a third. So too with those who gather birds' eggs, postage stamps, or other of the multifarious objects so ardently sought after by young collectors. From their own practice, the transition is natural and effective to the usage of naturalists who seek to arrange the multitudinous crowd of plants and animals into orderly sequence, giving to each kind the precise place in the series to which its special

structure entitles it. Examples of this method should be taken from the native flora and fauna until the principles of classification and the enormous advantages of carrying them out, are sufficiently impressed upon the minds of the pupils. This is an admirable discipline in orderliness of thought, and in testing the amount and accuracy of acquired knowledge.

CHAPTER X

POLITICAL GEOGRAPHY OF THE SCHOOL LOCALITY

FOR the effective instruction of the young in that wide and important department of knowledge, commonly, but not very happily, called Political Geography, the school locality forms an admirable centre and starting-point. Such matters as the partitioning of the earth's surface into countries and parts of countries, the local names assigned to these subdivisions and to the natural features that diversify them, the position and growth of cities, towns and villages, the distribution of population, the opening of communications by roads, canals, and railways, the distribution and increase of trades, manufactures, and commerce,—these and other topics embraced within the same extensive subject can obviously be made at once intelligible and interesting if they are first considered with reference to the illustrations of them which the surroundings of school may supply. I have already in previous pages referred incidentally to some of these questions, and I now propose to offer in the present chapter some further suggestions, bearing more especially upon the way in which the subject may be most usefully presented to young scholars in the elementary stage of geographical instruction.

On the whole, we may assume, as I have done in the foregoing pages, that the political side of geography should be taken up in tuition after the physical side has been begun. The outer aspects of Nature are more obvious and comprehensible than the artificial limits and complex conditions involved in the relations of man to the world he lives in.

How much progress should have been made in the one department before the other is commenced, must be left to the judgment and experience of the teacher. Much will depend in this respect upon the circumstances of environment. In towns, as I have already remarked, the political side is so obtrusive that it must necessarily be taken at a comparatively early period. In country districts, on the other hand, the physical side may longer claim predominance.

Names of places or of physical features have often a meaning which takes us back to old times, when the aspect of the landscape was very different from what it is now. They tell us of early races and languages which have almost or wholly passed away, engulphed and lost amid the immigrations of later centuries. Where the name of the school locality has any etymology of this kind it may be made the starting-point for profitable and attractive instruction in topographical nomenclature and ancient history. Let us suppose that the name ends in "ton." This common suffix carries the imagination back to the days of our Anglo-Saxon ancestors, when each settler possessing himself of his allotment of land enclosed it with a "tun" or quickset hedge. His property thus surrounded came to be known as his "town" and took his name. In the less enclosed parts of the country, there still exist isolated farm-steads which have been plausibly regarded as not improbably outstanding memorials of these earliest Saxon homes. In Scotland too, a group of farm buildings, not infrequently built round three sides of a square, is to this day called a "farm-town." As the early settlers drew together, they formed villages, which in favourable positions increased into populous centres. But the name applied to the original homestead has kept its place, and is still given to the crowded mass of houses and streets that make the modern "town."

The suffix "ham" (equivalent to the German "heim") likewise recalls the conditions of early English settlement. It implies some place enclosed or hemmed in, and has been consecrated in our word "home," which is strictly the family enclosure, hemmed in and protected from the outer

world. These terminations "ton" and "ham" are appended, in a vast number of instances, to the family name of the original possessors of the first enclosure or township. Thus Newington, Wellington, Harlington, Billingham, Collingham, Gillingham were the settlements of the Newings, Wellings, Harlings, Billings, Collings and Gillings. The epithets consequently preserve the remembrance not only of the names but of the distribution and settlements of the families of our Saxon forefathers in the land which with fire and sword they won for themselves from the Britons and Romans.

Names of towns ending in "burgh," "bury," or "borough," remind us of another feature of the early English colonisation of the country. They mark the sites of larger and more organised townships than the "tuns" or "hams," and were probably more capable of defence. As the "tun" was at first the fenced homestead of the farmer who cultivated his own land, so the "burh" was the fortified house and courtyard of the mighty man, the magistrate, noble, or king.[1] In times of war and invasion, the walls of the "burh" served as a shelter for the weaker neighbours and dependants of the overlord. The attraction of this security drew people to the place, who made their homes there. Gradually as the population increased, the fortifications might be extended so as to enclose the scattered habitations that had grown up under the shadow of the original fortress, and thus some walled towns have arisen. Or the inhabitants of the little town, owning no master, and zealous for their liberty and independence, surrounded themselves with protecting walls and formed their own free burgh.

Another termination "by," abundant in certain parts of Britain, takes us back to the times of the incursions of the Danes, and shows us where these sea-farers fixed their final abodes in this country. It is the Danish word for a village or town, but originally meant merely a single homestead, like "tun" in Saxon. We still retain it in the term "by-law," which is not a national but a local regulation made by

[1] Stubbs, *Constitutional History of England*, i. p. 105.

a town or society for its own purposes. Tracing on the map of England the distribution of such names as Derby, Rugby, Grimsby, Kirkby, Appleby, we can still note the districts colonised by the Danes. Distinctively Danish also is the suffix "thorpe," "throp" or "trop" which like the German form of the same word, "dorf," implies a group of houses or a village, and probably points to a later stage of colonisation than that indicated by the "hams" and "tons."

The sites of the settlements of our Norse progenitors are in like manner preserved to us by the suffixes "garth" and "wick" or "wich." Garth, or in its modern Norwegian form "gaard," is a place guarded or girt in—a yard, court, or house, and hence a country house with its surroundings (Fishguard, Applegarth). In modern Norwegian, a bay or ford is still called a "vig." Primarily the word appears to have been used of a place inhabited by man, a village or station, and as many such places in Scandinavia were placed in sheltered bays or creeks, it came ultimately to be applied to these convenient indentations of the coast-line. The sea-rovers who sailed out from the "vigs" or "vics" were called "vikings," that is, baysmen or creekers, and not "sea-kings" as is often supposed. They established themselves on many parts of the coast-line of Britain, and brought their language and their habits with them. The sheltered inlets where they landed and could draw up their boats they called "wicks," usually prefixing some family or descriptive name. Sandwich, for example, was pre-eminently the "sandy creek"—an appropriate name, for the sand has since accumulated to such an extent that the site of the old harbour is now a mile and a half from the edge of the sea. Ipswich, Harwich, Norwich, Berwick, and Wick were all no doubt settlements of the northern pirates.

The terminations corrupted from the Latin "castra," lead us still farther back into the early history of Britain, and remind us of the fortified stations and walled towns of the Roman conquerors. In the districts afterwards overrun by the Saxons the word became "Chester," as in Rochester, Winchester, Colchester, Chichester. In the

tracts colonised by the Angles and Danes it retained more of its original sound, as in Ancaster, Doncaster, Lancaster, Tadcaster. In the old kingdom of Mercia it was corrupted into "cester," with a strong tendency to elision, as in Leicester (pronounced Le'ster), Worcester (pronounced Wo'ster), Gloucester (pronounced Glo'ster).[1] A further mark of the presence of the Romans is shown in our topographical nomenclature by the epithet "street," applied to some of the great lines of highway built by Roman engineers, and many of which are still in daily use as main arteries of communication. Watling Street still marks the line of the great Roman road that ran across the island from the coast of Kent to Chester. The Ermin Street was the Roman road from London to Lincoln, and the Akeman Street went from London to Bath. Our very word "street" is the Latin "stratum," a paved way, and as the same word has been adopted by Norsemen, Swedes, Dutchmen, and Germans, we may infer that the Teutonic tribes knew nothing of paved roads until they marched over those made by the Romans.

But the Celtic names so frequent in our topography carry us to yet more distant and prehistoric times. Wave after wave of conquering races has swept over Britain since the first Celtic immigrants gave their well-chosen epithets to hill and valley and river. The Romans latinised these names, and the Saxons further corrupted them. But in large measure they remain still recognisable. Leaving for the present the numerous and expressive epithets bestowed on rivers and hills, I will refer here only to some of the town names, which remind us that not a few of our great cities were probably strongholds of the Gaels, before the Cymric Celts had come into the country. The word "dun," meaning a hill-fort or fortress, may be detected in many parts of the country—London (Londunium) has grown out of the original stockaded fort which the Celts placed on the rising ground where St. Paul's Cathedral now stands. The capital of Scotland also,

[1] Taylor's *Words and Places*, p. 173.

still called in Gaelic, Dunedin, or the fort of Edwin, Dunstable, Dunmow, Dundee, Dumfries, Dumbarton, and many others, might be quoted. Usually there is a more or less prominent eminence on which the Celtic "dun" stood, and which formed the original centre around which the town subsequently grew. In the Celtic parts of the British Isles thousands of hamlets, villages, and towns, bear names in which the Celtic word "bal" or "bally," a town, is conspicuous. Towns distinguished by the Welsh word "aber," or the Gaelic "inver," meaning "at the mouth of a river," will be found abundantly in those parts of the country occupied by the two branches of the Celtic people. Thus we have Aberystwith, Abergavenny, Aberdeen, Aberfeldy, Inverness, Invergordon, Inveraray, Inveresk.

The streets, roads, and buildings in the school locality have been already alluded to as forming appropriate subjects for some of the early object-lessons. Reference has also been made to the trades and industries of the district. These topics are capable of much fuller treatment, and offer many advantages for usefully dealing with the political aspect of geography, and for laying a foundation of knowledge of the elementary facts of political economy. The village, town, or city in which the school stands, will be first studied in detail, and will serve as the starting-point for the description of other similar aggregations of houses and people. Its limits, or, at least, those of the parish in which the school stands, will be traced on the map, and, where possible, on the ground. The idea of the parish as the original township, or cluster of townships, ministered to by a single priest, is one that can readily be understood, and where the locality has subsequently been entirely built over and incorporated in a large town, the boundaries of the parish sometimes throw an interesting light upon the original physical features, which have since been hidden under piles of buildings and rows of streets.

Questions connected with population are most effectively treated from the stand-point of the home locality. Large numbers are apt to convey no definite ideas

to young minds, but if we say that the whole number of men, women, and children in the parish or town is so many times that of the boys and girls attending school, the conception is at once simplified, and a standard is afforded for comparing the population of other places. The relative proportions of the sexes, too, may at the same time be mentioned, with remarks on the general preponderance of females in the world.

If there is any obvious reason why population should have been specially aggregated at the school locality, it may be pointed out in connection with the position and growth of the place. Villages, for instance, have not infrequently grown up around the parish church. At convenient points on rivers, or at the intersection of highways, groups of townships or hamlets have often gathered into towns. Facilities for the prosecution of a special industry have, in not a few cases, led to the establishment and rapid increase of towns. But unless the reason of the concentration of population is quite evident, the consideration of it should be reserved for a later stage of progress.

The gathering together of people to a centre suggests the subject of their occupations. Men must have food and clothing, and to gain these, labour is needful. Nature supplies us with abundant commodities, but they are not available for use without some kind of labour. Even those which, when procured, require no further treatment, have to be sought out and brought to where they are needed. Fuel, for instance, is furnished by Nature in various forms, such as wood, peat, and coal. But the trees require to be cut down and sawn into convenient logs ; the peat must be dug up and dried ; the coal needs to be laboriously mined and drawn up to the surface, and each of the materials must be transported to the houses or factories where it is to be burnt.

The different kinds of labour exhibited in the school district should be enumerated by the pupils and written down on the blackboard, as has already been suggested in connection with walks in town. An attempt may then be

made to classify them. First, all those connected with the supply of food may be placed together, such as the work of farmers, millers, bakers, cattle-breeders, butchers, grocers. Then would come those related to the supply of clothing —sheep-rearers, wool-spinners, tailors, leather-makers, shoemakers, hat-makers, cotton-spinners, shirt-makers, and so on. Next might be considered those that have to do with the means of transport of commodities, such as cart-makers, carriage-builders, engine-builders, ship-builders, carters, coach-drivers, railway-men, sailors, and many more.

From the prime necessaries of life and profitable employments, the lessons may pass on to the consideration of less needful things and luxuries. The connection between different trades and industries will be pointed out, and some insight will be given into the intricate network of relations and interdependencies on which our industrial system is built up. A book, for instance, furnishes an excellent illustration of the diversity of interests and community of labour for the public benefit. There is first the author who writes the book. His manuscript goes to the printer, who applies to the paper-maker for paper, to the type-founder for types, and to the ink-maker for ink. The written words of the manuscript are set up in types, and are printed off upon sheets of paper, which are sent to the bookbinder, who stitches them together and binds them into finished copies of the book. These are then transferred to the warehouse of the publisher, who makes the existence of the work known and hands it to the bookseller, from whom it is finally obtained by the public. Of course each stage in the process of bookmaking may be explained in considerable detail with the aid of such specimens or samples as may serve for convenient illustration. A series of types, for example, with facilities for placing them together and taking ink impressions from them, is a serviceable adjunct in teaching. It should also be pointed out that each of the individuals engaged in the production of the book makes, or at least hopes to make, some profit out of its sale.

If there are any special industries for which the school

district is remarkable, these will of course receive due attention. In a village school, situated in a rural and agricultural district, for instance, the operations of farming will be fully considered; in a mining district all that can be intelligibly presented regarding mines and miners will be given with every available illustration; among spinning-mills the history of weaving will be readily appreciated, and as weaving and spinning are of such universal importance they should be fully explained, with such samples of work and drawings of machinery as will give an adequate conception of the nature of these arts.

From the consideration of the raw materials, and of the various kinds of labour bestowed upon them in order to fit them for use and to give them their economic value, the attention of the scholars may be easily and naturally led to the subject of the exchange of commodities, and the elementary facts that lie at the foundation of trade and commerce. Of course these topics can only be touched upon lightly, their fuller treatment being left for a much more advanced period of training. But the broad essential facts are capable of being placed even before young pupils in an intelligible and interesting way, and their early and adequate comprehension is an important step in education.

The natural and original system of exchange by barter can be pertinently explained and illustrated from the habits of schoolboys themselves. The fortunate possessor of a superabundance of marbles exchanges (or to use his own phrase, "swops") as many of them as he deems a fair equivalent for some other coveted treasure. Or if he collects postage stamps he usually takes care to accumulate a supply of duplicates, from which he can barter for others which he has not yet been able to add to his store. From such familiar examples, the young imagination may be gradually led onward to realise that all wealth consists of property that can be exchanged for some other kind of property.

The labour, inconvenience, and wastefulness involved in a general system of barter can be made quite clear by a few supposed cases. If we could only procure commodities

of which we stood in need, by giving other commodities in exchange for them, we should need to seek out those persons who happened to have what we wanted, and who at the same time required what we possessed. It would not always be easy to find persons at once willing and able to barter with us, and the commodities would often in the meanwhile deteriorate by waiting or by transport. A shoemaker, who could only obtain bread by giving his wares in exchange for it, might sometimes starve before he found any one ready with bread to barter, and who also needed shoes, or he might have to part with his goods for much less than they were worth. A dairyman, who had only his milk to barter for a new coat or hat, might find it turn sour and worthless before he could meet with any one needing milk and also able to supply the coat or the hat. Such obvious illustrations of the inconvenience of a system of barter will enable the scholars to understand the next step in the process of reasoning and experience, the necessity of some general medium of exchange and standard of value for exchangeable commodities. This medium we call money.

A good deal that is of general interest may be told regarding money, especially bearing upon its use in facilitating exchange. The children will, no doubt, be found to share the common belief that money means coin. They should be made to understand that any suitable material might be chosen as the medium of exchange, and an account of different kinds of money should be given to them, such, for instance, as leather used by the ancient Carthaginians, cowrie-shells by the present natives of India and Africa, glass beads by the tribes in the interior of Africa, cubes of compressed tea by the modern Chinese, bars of iron by the people of Britain in Cæsar's time. So far from money being necessarily coin, there are many savage tribes by whom our coins would be rejected in favour of the cowrie-shells, glass beads, or other medium of exchange which they have adopted. Even at the present day tons of cowrie-shells are annually imported into Britain that they may

be sent out to trade with African tribes. Large quantities of glass beads are manufactured in this country for the same purpose. But the adoption of any medium of exchange marks a decided advance in mental progress beyond the conditions when only barter is practised.

Next may be considered what kind of material is best suited for a medium of exchange and standard of value. Evidently substances which are durable, possess an intrinsic value of their own, are not liable to sudden and great fluctuations in that value, and contain a large value in small bulk, are best adapted for this purpose. These conditions being amplified and made thoroughly intelligible to the pupils, will lead to an account of the precious metals, and why they have from the earliest times been selected; how at first they were used in irregular pieces, bars, spikes, or rings that were weighed when given in exchange for commodities, and how by degrees the practice of stamping the pieces with their weight, led to the process of coining the metals into pieces of convenient size and given weight, stamped with the mark of the ruler or government.

A series of the coins now in use in this country should be exhibited to the scholars, who should be exercised in discriminating and naming them. The school museum should also contain, if possible, a few examples of old English and Scottish coins for purposes of comparison, especially of the more notable forms mentioned in history and literature, such as the noble, angel, guinea, bonnet-piece, plack, groat, merk; likewise some Roman coins, more particularly of some of the emperors who lived during the time of the Roman occupation of Britain. These objects are not to be regarded as mere curiosities. Coins possess a great value for historical purposes. They are, in fact, historical documents of a specially useful kind, for they not only serve to confirm written history, but they often settle questions that written history has left doubtful, and supply information regarding which all the chroniclers are silent. They have an important bearing also upon the development of art. They preserve portraits of many of the prominent rulers

of the past, regarding whose physiognomy we should otherwise be wholly ignorant.

The history of the word "money" is characteristic of the way in which the memory of ancient customs, beliefs, or habits, that have utterly disappeared for long centuries, is preserved in the current speech of the day. "Money," and the name of the "Mint" where money is coined, come to us through the French from the Latin, and carry us back to the days of ancient Rome, when money was coined on the Capitoline Hill, at the temple of Juno Moneta. Among the early Latin people the chief wealth probably consisted in herds of cattle (pecus); hence wealth of any kind came to be called "pecunia," and by a natural transference this word was eventually applied to money. Thus our words "pecuniary" and "impecunious," are really relics of the time when the shepherds of Latium pastured their herds on the slopes of the seven hills, and along the banks of the Tiber, where, in after times, arose the streets and bridges and temples of Rome.

The subject of banks and banking cannot be properly entered upon in the elementary stage. But some of the fundamental ideas regarding the borrowing, lending, and depositing of money may be simply presented, together with some account of what is meant by interest. Post-office or other savings banks are now to be found in most towns and villages, and children at an early age become depositors in them.

The necessity and value of roads for keeping up the communications of one part of the country with another, may be effectively inculcated by supposing what the school district would be without roads. In rough ground, and also where the clayey soil of the fields is in wet weather trodden into mire, the importance of a good firm road is at once recognised. But try to picture the roads suddenly obliterated, and imagine the paralysis that would at once fall upon the social condition of the country. There could be no wheeled conveyances of any kind, and, consequently, all trade and transport, even of the necessaries of life,

would be impossible, save on such a feeble scale as could be accomplished with pack-horses. Yet this was once the state of all countries. The foot-track or bridle-path, trodden hard and bare by successive generations of wayfarers, and still to be seen in the more hilly and mountainous districts, was the earliest kind of road. The more miry places were from time to time filled up with stones and herbage, to keep man or horse from sinking; but, otherwise, there was no attempt at road-making. The Romans were the great road-makers of the ancient world. Their magnificent highways and bridges remain to this day among the most striking and enduring monuments of their engineering skill, and of that practical sagacity which lay so directly at the foundation of their material wealth and power. Portions of their paved roads are still to be seen in some parts of Britain. Deep beneath the rubbish of modern Rome lie remnants of the streets of the Cæsars, with their polygonal blocks of lava, worn by the feet of passengers and chariots that have been silent for nearly two thousand years. Yet with such noble examples of well-made roads as the Romans left behind them in Britain, our English ancestors never became road-makers. They made use of the great Roman highways, but their genius did not lie in the direction of building new ones. For hundreds of years, people were content with mere bridle-paths, which in many places were utterly impassable in wet weather. It is told that, on one occasion, Cromwell's forces captured eight hundred horses that had actually stuck in the mud. There could of course be no general use of wheeled carriages in a country where such was the condition of the public roads. Even the kings and nobles, when they had occasion to travel, did so on horseback. Down to the year 1736, the roads around London were so bad that in wet weather a carriage took two hours to crawl from St. James Palace to Kensington, if it did not get hopelessly bogged on the journey.

A few incidents of this kind will serve to bring home to the minds of the pupils how much of their everyday com-

fort they owe to the existence of good roads. Some information may be given about road-making, and especially the system of "macadamising," now generally followed in the construction of highways. Macadam was an ingenious Scot, born in the middle of last century, who conceived the idea of making a thick bed of fragments of hard stone, and allowing it to be consolidated and smoothed by subsequent traffic. In the end, a hard, firm, and smooth road was thus formed. But this satisfactory result was not accomplished without great labour to horses, and much tear and wear of wheels, until the device was adopted of putting a heavy roller over the loose stones, and consolidating them before the beginning of traffic on the road. Ponderous steam-rollers are now employed, by which a stratum of broken fragments of granite, basalt, limestone, or other durable rock, is in an hour or two converted into a solid and smooth roadway. If at the school locality any other kinds of road-making are practised, such as causeways of stone or of wood, pavements of flagstones or asphalt, these may be made the subject of passing remark, either in the class-room, or during one of the walks. The existence of a canal in the neighbourhood may also suggest an occasion for giving an outline of the construction and history of canals.

Intimately connected with the history of roads and road-making is that of wheeled vehicles. Pictures of Egyptian, Assyrian, Greek, and Roman chariots, and of the waggons and early coaches of our own country, enable some idea to be formed of the stages through which carriage-building has passed. Remembering that only two or three centuries ago the public roads in England were too bad to admit of the use of carriages, we can well believe that carts without springs were all that were available even for the conveyance of the wealthy, who, consequently, preferred to ride on horseback. About the end of the sixteenth century, waggons came into use for public conveyance. Stage-coaches began to be introduced during the next century, but only on some of the chief highways of the

country. They were lumbering constructions that took more days to a journey than an express train now takes hours. At the beginning of last century, for instance, they needed a week to go from London to York. The advertisement for that journey has been preserved, and runs as follows; "Whoever is desirous of going between London and York, or York and London, Let them Repair to the Black Swan in Holboorn, or the Black Swan in Coney Street, York, where they will be conveyed in a Stage Coach (if God permits), which starts every Thursday at Five in the morning." Anecdotes of the old coaching days, showing the inconveniences and even dangers of the journeys, serve to bring home to the imagination the enormous progress which this century has witnessed in all that concerns locomotion. Much interesting information on this subject will be found collected in Smiles's *Lives of the Engineers.*

A tramway or railway within reach of the school will give occasion for a lesson on the modern history of locomotion. Few people who make use of tramways are aware of the origin of the word. It is a contraction of "Outram ways" so named after Benjamin Outram, who finding iron railroads in use for wheeling waggons at the coal-mines in the north of England, proposed their adoption for general traffic above ground. The first public road-tramway in England was opened in 1801 as the Surrey Iron Railway from Wandsworth to Croydon and beyond. But it is only within the lifetime of the present generation that tramways have been generally introduced into towns. The ease with which even a single horse can draw a heavy waggon or series of waggons along a line of iron rails was a most notable discovery, at a time when men's minds were turned to the possible applications of steam-power. But not until 1830 was the first railway opened, where the traction power was that of steam locomotives. The story of the construction of the first locomotives and the struggles and difficulties amid which our gigantic railway system had its birth, is graphically told in Smiles's *Life of George Stephenson.*

From modes of locomotion, we pass naturally to the consideration of the means of communication which the school locality possesses with the rest of the country. The post-office will supply the teacher with material for much interesting and profitable talk with his pupils. Of course in this as in most other subjects, he cannot enter into full details, which are only intelligible after some considerable progress in education has been made. What he has to aim at is the presentation in clear and definite outline of the leading characteristics of the post-office organisation, in order that the children may understand how, when they write a letter and drop it into the post-office, it is carried to the person for whom it is intended. They are familiar with the sight of the postman going his rounds; they see that he delivers letters that come for their parents, or even sometimes for themselves; they pass the post-office constantly and notice that letters are put into the box at the window. What they have thus learnt by their own observation will form the basis of the teacher's further explanation.

The first thing to be remarked about a letter intended to be sent by post is that, besides having the name and address of the person on the outside, a postage stamp is affixed to it, before it is consigned to the post-office. Some account of a postage stamp will then be given, the class being asked to examine and describe a penny stamp from samples shown to them. The main idea, of course, that will be conveyed, is that the stamp is equivalent to a kind of contract or promise that the government of the country, in consideration of the price paid for the stamp, will convey the letter to the person to whom it is addressed. The Queen's head upon the stamp is thus the symbol of this national guarantee. Next, it will be shown that the price charged for the conveyance of letters depends upon their weight, and a few of the ordinary rates for inland postage may be mentioned. To provide for these differences of weight, various stamps of different values are issued. Samples of the more generally useful of these should be exhibited.

The letter being weighed and found to come within the

limits of weight prescribed for the penny stamp, has one of these stamps affixed to it and is dropt into the letter-box at the post-office. Its further progress should now be traced by the teacher. An envelope which he has received through the post, and on which the various office stamps are legible, will supply him with an illustration of the system of obliterating the postage stamp with the mark and date of the receiving-office; and he can then in imagination follow the letter from the receiving office to the mail cart, thence to the train, and so on to the post-office from which it is to be finally delivered, and the dated stamp of which is put upon it before it is handed over to the postman to be carried to its destination. Various illustrations may be taken to show the different modes of conveyance adopted by the post-office, such as carriers, runners, mail-carts, stage-coaches, railway-trains, sailing-boats, steam-boats. And it should further be explained that not only letters, but papers, books, and parcels of many kinds may be sent through the post, the rates of conveyance being still regulated by weight.

The telegraph posts that rise along most of the highways of the country, and the wires that pass from them into the post-office of almost every village have been familiar from infancy to the children, and demand some exposition from the teacher. Obviously he cannot give them any adequate explanation of the electric telegraph, but must reserve that for a much later stage of their progress. All that he can attempt is to make them realise that the movement communicated at one end of the wire travels with the speed of lightning to the other end, and that the indications made by the needle of the operator are repeated by the needle of the recipient, according to the alphabet or code of signals agreed upon. Much must be taken for granted by the young learners, yet they may be enabled to grasp the idea of an almost instantaneous transmission of motion. The familiar experiment of a long row of billiard balls or of common smooth marbles, which, touched at one end throws off its last ball at the other, may be referred to. But a much more accurate analogy is supplied by two glass tubes

connected with a piece of elastic tube which may be as long as the class-room. Water introduced into one of the glass tubes will flow along the connecting tube, and rise to the same height in the other glass tube. The raising or lowering of the glass tube at one end will be immediately followed by the corresponding rise or fall of the water-level at the other end. And a code of signals could then be arranged for transmitting messages from one tube or station to the other.

Another important feature of the post-office ought on no account to be omitted—its dealings with money for the benefit of the community. As already suggested, an account of the system of post-office savings banks should be given, the children being encouraged to make trial of it by depositing some of their savings there. Reference may also be made to the way in which money may be sent through the post-office by means of orders, even to the remotest corners of the country.

I do not propose that much in the way of statistics in connection with the post-office or with any public service should be put before the pupils in the elementary stage. The number of millions of letters posted in a year, the amount of money annually deposited in the post-office savings banks, the length of lines of telegraph wires, the number of miles of railway opened, and so on, are questions that relate to the country as a whole, and not to the school locality. I would, therefore, postpone them until the elementary stage has been passed, when their full significance can be better appreciated in connection with the political geography of the country as a whole. All that seems to me desirable at first is to take up only those broad intelligible facts that lie as it were on the surface, and are suggested by the surroundings of school,—facts which children ought to know, and which, if clearly and vividly put before them, they take pleasure in learning.

I come now to the consideration of a subject, the importance of which, in geographical teaching, it is hardly possible to exaggerate,—the necessity of connecting the present aspect of the country, and the present political

boundaries and social conditions with those which preceded them, and out of which they have gradually grown. It is only in proportion as we realise what has been, that we can properly appreciate what is. And yet how constantly do we see geography taught as if the existing state of things had always been maintained; as if, for instance, the modern limits of countries had the same persistence and fundamental character as geological boundary-lines. Obviously the study of the present must come first, but we should never forget that the result must necessarily be superficial and imperfect, until it has been connected with an inquiry into the past.

Now this relation holds true even in dealing with the geography of the school district. I have already alluded to one or two illustrations of it which show how vividly our appreciation of the present conditions of life in this country is heightened by a knowledge of what preceded them; how impossible it is for us adequately to recognise our own advantages unless by contrast with the disadvantages under which our forefathers lived. Of course, the full development of this department of teaching can only be reached at a comparatively late stage in the progress of the pupils. But the main idea involved in it can hardly be pressed too soon upon their attention. There are many simple ways in which this may be done, of which full advantage should be taken.

Every old ruin, every historical monument, every memorable site, battle-field, or birthplace is eloquent of the past, and may be made the text for a lesson that will rivet the attention of even the most careless scholar, and impress the moral of that lesson for ever on his memory. Or if such examples fail, how often may the same end be gained from the parish church! Its weather-beaten walls and lichened buttresses, its mouldered carvings and mossy roof speak to us pathetically of bygone days. And if from the general impression it thus makes upon us, we look on it more closely, that impression may be sensibly deepened. The scars that have been made on its venerable structure by

the mere lapse of centuries of summer sun and winter storm have, in many cases, been less fatal than the ravages wrought by the hand of man, whether as ruthless destroyer or hardly less relentless renovator. Different styles of building may often be detected, showing that the edifice is not all of one age, but having been repaired or partly rebuilt at widely-separated epochs, bears witness in these restorations to the gradual changes in architectural taste. So, too, with the tombstones of the churchyard. Their inscriptions serve to fix their respective dates, but even without this guide it would be easy to tell these approximately from the different styles of monument. The church and its surrounding graves will come to gain a new interest, when they are made in this way the means of carrying the thoughts of the young learners backward to generations that have long passed away, to times when the aspect of the country was not quite what it is to-day, and when the conditions of social life were likewise in many respects different.

Again, an ancient castle or keep, regarding the history and occupants of which something can be told, forms an excellent text from which to discourse upon the political changes of the district. Standing with his pupils within the silent courtyard or in the roofless hall, the teacher can repeople them with the life and stir of another time, and make his young friends feel as they never did before how real is the past out of which we have come. Every historical site likewise furnishes the opportunity of driving the same lesson home into their hearts. As they walk over it, the contrast between its present and its former aspect comes vividly before them. They not only realise more clearly the event for which it is memorable, but they recognise again, or at least unconsciously feel, how by many subtle links their life is bound up with the past. Ancient camps, barrows, standing-stones, in short, all kinds of historic and prehistoric monuments may be made of altogether inestimable value in impressing upon them these two memorable truths, self-evident apparently, but so apt to be overlooked,

that things have not always been as they are, and that the past, though now so dim and remote to us, was once a real living present.

Where within reach of a school, therefore, any such memorials of antiquity exist, they ought on no account to be overlooked by the teacher. If possible, they should form a prominent feature in some of the class excursions; at all events, they ought to be visited by the pupils, and the lessons they are calculated to convey should be inculcated in the class-room. And here let me point out the opportunity which the subject affords of invoking some of the better feelings of the young. These mouldering relics of the past speak to us as with the voice of our fathers; they appeal to our sense of sympathy; they claim our loving care and respect. The rude and ribald spirit of desecration which cuts names on their worm-eaten woodwork, scribbles over their walls, or breaks off corners from their mouldering carvings, ought to be absolutely repressed. In its place, there should be fostered a spirit of reverence and of affectionate regard for what even the relentless tooth of time has spared to us of the work of our forefathers.

But where no antique monuments are to be met with at the school locality, some of the benefits to be gained from visiting them may in another form be derived from such lesser objects of antiquity as may have been preserved in the district, or may even be included in the contents of the school museum. Man has always been, and unfortunately still is, essentially a fighting animal. Hence the portable relics which he has left of his presence consist in large measure of weapons, either for war against his fellows or for the chase. And the proportion of such objects among the whole series of relics becomes progressively larger the higher their antiquity. It is most impressive and instructive to examine a collection of these antiquities, and to trace in it the evidence of the successive stages of civilisation through which mankind has passed. The huge guns and delicately-constructed rifles and revolvers of to-day may be compared and contrasted with the long culverins and

awkward blunderbusses of our grandfathers, and these again with the catapults and javelins of antiquity, or with the flint arrow-heads and rude stone axes of prehistoric times. Some of these objects can usually now be found within easy reach of school. Even in small towns, there are generally museums, among the multifarious contents of which ancient arms and armour may be seen. And in retired country districts, there is often the squire's or laird's house with its store of local antiquities, which would no doubt be generously open to the visits of the teacher and his pupils.

Each stage in the development of offensive and defensive armour marks a definite period in national history, and was accompanied with political conditions more or less unlike those that now exist. A slight sketch of these differences gives additional interest to the sight of the objects. A suit of mail, for instance, will naturally lead to a description of the tournaments of old times, the feudal barons and their retainers, the state of the peasantry, and the contrast between the conditions of life in those days and those of our own time. A few stone implements will give occasion for an account of the ancient flint-folk and of the bison, bear, rhinoceros, elephant and other extinct animals which they chased amid forests and moors that have long ago disappeared.

Where such concrete examples are available for purposes of instruction, little difficulty will be met with in enforcing the lesson they are so well adapted to convey. Where they fail, the teacher must fall back upon the simplest instances that come within the experience of the pupils, such, for instance, as endeavouring to realise what the aspect of the country, or the circumstances of life, would be without some of the improvements of them, which the last two or three generations have effected. The object up to which all such illustrations are meant to lead, is to impress upon the youthful mind the mutability of geographical conditions, more especially of those which are due to the interference of man, and the indissoluble connection of what is now with something which preceded it. The

physical features of a country change indeed, but so slowly that, so far as regards the experience of a single generation, they may generally be taken as wellnigh permanent. In regard, however, to such aspects of the surface as are determined by agriculture, by arboriculture, by deforesting, by the erection and growth of villages, towns, and cities, or by the formation of roads, canals, and railways, the influence of man may produce an extraordinary difference, even within a human lifetime. The political boundaries are not less shifting. New parishes, new villages and towns, new roads and railways, make their appearance, while old boundaries are altered. The progress of colonisation and discovery is continually adding fresh districts and names to our maps, while from time to time, even in the regions which have been longest the abode of man, war and conquest bring about new adjustments of the boundaries of states. Hence the importance of inculcating, even at an early stage of education, that the political landmarks of a country are not hard-and-fast lines, like those of rivers, valleys, and mountain-chains, but have shifted again and again, according to the progress of the events of history.

CHAPTER XI

RELATION OF THE SCHOOL LOCALITY TO THE REST OF THE COUNTRY, AND OF THE COUNTRY TO THE REST OF THE EARTH

THE subjects treated of continuously and in logical sequence in the foregoing chapters need not of course be presented in such formal and methodical order to the pupils. As I have already insisted, they should be taught in a natural and spontaneous way. It is not, in the first instance, of such moment that any definite order should be followed as that the subjects should be made attractive, and the interest of the pupils in them should be awakened and sustained. Whether the instruction has been given in a methodical or more desultory fashion, much varied information about the home locality will have been brought together. Before proceeding farther, and enlarging the circle of vision by entering upon a wider geographical area, beyond the personal acquaintance of the pupils, it will be found of great advantage to arrange and summarise this information. By so doing, the teacher connects the scattered data, and illustrates in a memorable way the value of a principle of classification in helping us to deal intelligently with a multiplicity of facts. He enables his scholars to obtain a clearer and more comprehensive view of the school locality and its surroundings, because they now are led to perceive the significance and connection of the various scattered and isolated particulars that have been brought to their notice in the class-room and in the walks. And above all, he provides an excellent example of that comparison and co-

ordination of data, so essential in all departments of human inquiry, and so characteristic of every subsequent stage of geographical instruction. He, as it were, takes stock of the progress of his scholars at the end of the first stage of their geographical education, and makes an important forward step in the direction of more advanced teaching.

While this revision and classification of ascertained facts is desirable under any circumstances, it must obviously be much more easily and effectively carried out in some localities than in others. Where, for instance, the school is situated in a little town surrounded by a country district presenting considerable variety of topographical detail, the conditions are pre-eminently favourable. But even where such advantages are absent, the loss of them may usually be in some measure compensated by the ingenuity and care of the teacher himself. The object to be attained is so important as to require and reward the utmost attention he can give to it.

The parish generally forms in this country a convenient and well-defined area as a basis for this first essay in the geographical description of a portion of the earth's surface. The facts having been ascertained in a previous series of lessons and walks, the gathering of them together and summing up of the information will now be done by the pupils themselves, in reply to questions and promptings by the teacher, who should first carefully think out the plan of classification to be followed. The order of treatment must, of course, be largely dependent upon local circumstances, but I will assume, for the sake of illustration, that some such grouping as the following can be adopted. Whatever be the plan, it is essential that the various headings should be legibly written in consecutive order upon the blackboard, in order that the pupils may see exactly as they proceed, where each group of facts is placed in the general account of the parish. It is desirable also that the lessons should be based on a good large map of the parish. The parish plans of the Ordnance Survey of Great Britain on the scale of 25·3 inches to a mile make valuable maps for schoolroom walls.

Starting with the name of the parish, and taking note of anything that has been learnt regarding its meaning and origin, the scholars should first trace the boundaries of the area on the large map or parish plan, and be made to describe them in words. Under the head of "Natural Features," a succinct description of the parish should be given, its topography, system of drainage, rocks and soils, with the areas of cultivated ground, woodland, and other marked varieties of surface. If any progress has been made in gaining acquaintance with its "Natural History," such facts as have been acquired may be tabulated under that head; and under the division "Population," a classification will be called for of the various employments of the place, and a reference to any characteristic local industry. Under the title of "Means of Communication," a summary will be given of the various main roads and lines of railway or canals that traverse the parish. "Postal Arrangements" will lead to a short statement of the routes by which letters are sent; of the number of posts out and in, and of the lines of telegraph wire. Under the heading of "Educational Arrangements," the attention of the scholars may be called anew to the provision made for the teaching of the young in the place,—infant schools, board-schools, private schools, etc., with such details as the teacher may think proper to be known, such, for instance, as the number of boys and girls under instruction, the average annual number of school hours, the average length of time of attendance at school, and so on. Some such division as "Administration" will serve for the grouping of any facts that have been gathered respecting the local government of the parish, particularly in connection with ecclesiastical matters, the relief of the poor, and the repair of roads. A classification of this kind will make the school locality serve as a sort of model or type of geographical description, and as a fitting introduction to the wider views that must henceforth be taken in the work of the geography class.

That the subject of the school and its surroundings forms the best practical introduction to the study of geography

has now, I trust, been sufficiently enforced. Before he has made much progress in it, however, the teacher will have recognised how impossible it would be for him to restrict the attention of his scholars entirely to the home locality. They begin at an early age to pick up notions more or less accurate about what lies outside of their own little circle of experience. At home and in intercourse with their companions, they learn more and more of the world at large. To avoid all reference to this gradually widening experience would be a great mistake on the teacher's part. His aim, on the contrary, should be to keep pace with it in his lessons, and to make use of it for purposes of instruction. I have already incidentally alluded to various sides from which the examination of the home surroundings leads out naturally and inevitably into the geography of the whole country. And I now propose to offer some further suggestions on this subject.

Before the country as a whole is formally taken up as a class-book subject, a broad and solid foundation of elementary knowledge regarding it may be laid, so that when at last a class-book is put into the hands of the children, they are already prepared to enter with pleasure and profit upon the details then brought to their notice. To gain this end should be the aim of the concluding part of the elementary stage of geographical teaching. But it will be reached by no abrupt transition either of subject or of method. If I have succeeded in making clear my conception of the plan of education, it will be seen that the same practical method of instruction, so advantageous with regard to the home environment, should be continued when the horizon of vision widens. Already before the lessons are begun that deal with the geography of the fatherland, allusions and suggestions have been made that have prepared the way for the fuller treatment of that subject, which, therefore, when at last reached is not by any means unfamiliar.

The topography of the school neighbourhood can be learnt by actual inspection of the ground. Where under favourable circumstances this can also in some measure still

be done for districts lying beyond that neighbourhood, excursions to such more distant localities ought on no account to be neglected; for by no means can correct geographical conceptions be so effectually obtained as by personal travel and experience. But for the most part, such excursions will not be practicable. The want of personal acquaintance with wider regions is, however, supplied in large measure by the constant use of good maps. The rough diagrams of the school and its immediate vicinity made in some of the early lessons upon the blackboard, and the subsequent use of the large parish plan or map will have enabled the pupils to form some more or less definite notions as to the real meaning and use of a map. But so essential is an adequate conception of this subject, that the teacher will do well to exercise the scholars until he is assured that they have really gained this conception. Unless they have done so, they had better not proceed to the geography of any region beyond the school district. Ideas of relative distances, areas and proportions, in geography should, from the first, be as accurate as possible, and for this purpose it is absolutely necessary that maps should be understood and intelligently used.

Though actual journeys beyond the limits of the parish or immediately surrounding district may not be possible, much advantage will be found in making imaginary ones, the teacher acting as leader and guiding the scholars in traverses across the map. In this way he can effectively attain three important ends. In the first place, the method being more lively than mere narrative, and affording ample scope for originality of treatment, the attention and interest of the pupils are more awakened and sustained. As much as possible of the spirit of an actual journey over the ground must be maintained. In the second place, as the pupils are incited to find out for themselves what the map can teach them, their eyes are kept on the alert, their powers of observation and reflection are continually appealed to, and recognising feature after feature, they experience something of the zest of personal discovery. In the third place, the

method gives them an abiding sense of the meaning of a map, and trains them in its practical use. Of course, at every step the fuller knowledge of the teacher himself will come in to amplify and vivify the details of the map.

To carry out this idea effectually, it is needful to procure a good large county map. In this country, one or two sheets of the Ordnance Survey Map, on the scale of one inch to a mile, and embracing a region of, say twenty or thirty miles around the school, are well suited for this purpose. On such a map, it is well at the outset to have distinctly shown by colour the area or boundaries of the school parish which have been already traced on the ground, and are displayed on the large parish plan. This area, being thus conspicuously marked upon the county map, forms a convenient unit from which the relative dimensions of the other geographical subdivisions may be estimated. It will generally be found, before the use of the map is begun, that the scholars are already familiar with at least the names of the more important towns, rivers, and ranges of hills, so that for the detailed study of the map, they are furnished with a certain amount of preliminary knowledge.

The journeys may be supposed to be made by road or railway, or by ascending the main stream of the district and its tributaries. The advantage of proceeding by a line of route already engraved upon the map is obvious. From the outset, the points of the compass should be kept steadily in view, and constant references should be made to the respective positions of the places touched at. A scale of miles should likewise be used, and the distances should be measured with it from place to place.

The natural features, so far as these are represented on the map, will receive attention as they are met with. Lines of valley or ridge, prominent hills, rivers, and tributaries, lakes, watersheds, and other topographical details will be noted as they are crossed, or as they lie to right or left in the course of the journey. The nature of the surface in the region traversed can generally be made out from a good

map on a large scale. Rocky ground, marshes, moors, woods, and arable land, for instance, may be so deciphered from the patterns of engraving employed. The pupils should accordingly be exercised in interpreting these signs. In short, as much information as possible should be got out of the map. This the teacher will fill up and enlarge from his own fuller knowledge of the ground.

But, of course, in journeys, real or imaginary, by road, rail, or river, the natural features hardly claim as much notice as the towns that form the principal halting-places. In traversing the map in different directions from the school as a centre, it will be obviously desirable to take note even of inconsiderable places. Though of little consequence in themselves, and not to be found on the general map of the whole country, they may be of interest and importance locally. Each village and parish church, each little town, each notable ruin or historical site that may lie along the route, will offer opportunity for comment. Whatever the children may already know about it will be elicited by questioning, and such additional information as may help to complete their mental picture of the locality and its associations will be supplied by the teacher. The lines of main highway and of railroad will be traced across the map, and reasons will be sought in the form of the ground and the position of the chief centres of population for the routes that have been chosen for these means of communication. The distribution of villages and towns may be made an instructive subject of inquiry. It suggests how the accumulation of inhabitants at certain points has been determined, sometimes by convenient topographical features or by copious springs, by richness of soil or of minerals, by the advantages of position offered at a ford across a river or at the junction of two streams. A contrast may be impressively drawn between the sleepy quiet and small size of towns in purely pastoral or agricultural districts; and the noisy bustle and frequently huge dimensions and crowded population of towns situated in manufacturing or mining districts. The slow growth or almost stationary condition

of the one may likewise be contrasted with the rapid development of the other. A good example of this difference is furnished by the towns in the eastern and western divisions of Yorkshire. The former, such as Beverley, Great Driffield, and New Malton, are in some instances of venerable antiquity, but they have hardly advanced beyond the importance of mere market-towns in an agricultural region. The western towns, on the other hand, such as Leeds, Bradford, Sheffield, Halifax, and Wakefield, situated on or near the great coal-field, have grown rapidly into vast commercial centres.

In the course of a series of traverses in various directions from the school as a centre, a considerable stock of miscellaneous information regarding the surrounding region will eventually be acquired by the pupils. Before they are ready to pass outward to a yet more extensive geographical survey, it will be desirable for them to pursue a similar course to that which they followed before quitting the consideration of the parish. They will be asked to arrange in summary form the information they have gathered, so as to compile a geographical description of another definite area of ground. In the United Kingdom, and generally in English-speaking countries, the next area after the parish for purposes of this kind is the county. And what now remains to be accomplished is to do for the native county what has already been done for the native parish. I need hardly add that, as before, this compendium is to be elicited *viva voce* by questioning, and is not to be a written task until the elementary stage of tuition is passed.

Still proceeding mainly upon the groundwork of the map, the pupils will trace out there the limits of the county, and describe them in words. These limits should be prominently defined with colour on the same map (county or Ordnance one-inch sheet) on which the area of the parish has already been marked. The respective dimensions of parish and county can thus at once be appreciated, and the sense of relative proportions is thereby continuously educated. In taking up the subject of the county, the teacher

will perceive that as the district is so much larger and more varied than the parish, more scope is afforded for geographical description, while at the same time, the experience of the scholars having in the meanwhile been augmented, they are much more fitted for the task. Hence the account which he draws up from their answers to his questions and suggestions, will still better serve as a kind of sample and foretaste of what geographical description is. He will take good care that all his subdivisions are conspicuously written on the blackboard, so that the place and significance of each series of facts may be duly noted.

Either at the beginning of this summary or at some later stage, according to the capacity and acquirements of the class, some information should be given regarding the two words "county" and "shire." Though used now as equivalent terms, they have had very distinct origins and carry us back to different conditions in the political development of the country. The word "shire" transports us, for instance, back to Saxon times. It is akin to the words "shear" and "share," and was applied to a section or share of land taken out of the whole for some purpose. An Episcopal diocese, for instance, was sometimes spoken of as the bishop's "shire," and the parish was the "kirk-shire." Gradually the term came to be restricted to a certain division of land under the jurisdiction of an officer or reeve, who was known as the "shire-reeve," who has become our modern sheriff. The word "county," on the other hand, brings before us another and later phase of political evolution. Properly and originally it meant the territory acquired and administered by a count. But while the Norman-French title of count gave way to the older Saxon title of earl, the word countess was retained for the wife of an earl, and county, which was properly his domain, came into use as a synonym for shire.

A few examples of the different types of county names will show how well these local designations still preserve the memory of the early subdivision and settlement of the country. Thus Middlesex, Sussex, and Essex, mark out

still the respective areas of ancient Saxon kingdoms. Norfolk and Suffolk preserve the memory of the northern and southern tribes of the Angles. Cornwall hands down the recollection of the Welsh cut off from their British compatriots in the horn or promontory of Devon and Cornwall. Again, the place of the territory of the Cymri of the north is preserved in the name Cumberland, and so with the tribal names of Devon, Somerset, Dorset, Kent. On the other hand, the memory of the territorial jurisdiction exercised from the chief town of a district by the shire-reeve or other dignitary is preserved by counties that take their name after the county-town where the court was held, such as Yorkshire, Derbyshire, Warwickshire, Staffordshire. Thus the topographical names for the political subdivisions of England have gradually grown out of the complex historical development of the English nation. It is not by mere accident that we say Kent, and not Kentshire, Norfolk, and not Norfolkshire, Westmoreland, not Westmorelandshire, Surrey, not Surreyshire. Each name is a survival and record of the ancient distribution of tribes which afterwards united to form the English people. Of course, there are exceptions and anomalies in this topographical nomenclature, but these may be reserved for a more advanced stage of progress.[1]

The grouping of subjects in the geographical account of the county will naturally follow some such arrangement as that already suggested for the parish, though of course there will be local modifications in every case. First will come the general physical features of the district, including the form of the ground, lines of hill and valley, streams and watersheds, the prevailing character of the surface and soil, (as clay-flats, sand terraces, gravel ridges, and so on, each marked variety of soil being generally distinguished by its own kind of vegetation); general nature of the rocks if

[1] Among the exceptional cases in county names are the modern and incorrect innovations Somersetshire and Dorsetshire, which should be merely Somerset and Dorset, the lands of the Sumorsætan and Dornsætan. Shropshire is the area of the Scrobsætan or men of the scrub. These were original tribal settlements. On the history of the English shires see Stubbs's *Constitutional History of England*, i. p. 129 *et seq.*

any are exposed or form marked features in the county, such as lines of chalk-down or limestone-escarpment. Something can probably be said about the climate of the county; but at all events, the school records of the barometer and thermometer are available for part of the subject, and probably some facts can be added about rainfall and weather, the number of rainy and rainless days, and other matters that have already engaged the attention of the class. The natural history of the county can scarcely be ventured upon, but the mention of the subject in its place will call attention to it, and any information which the scholars may have acquired regarding it will, of course, be noted. Under the head of Population, a summary will be made of the data that have been accumulated,—number of inhabitants male and female, chief occupations, localisation of industries, etc. Attention will be given to the proofs afforded by the county of the influence of the character of the surface, or of underlying mineral resources upon the population, as, for example, in pastoral, agricultural, and mining districts. The distribution of the population will lead to the consideration of the number, grouping, and names of the parishes, villages and towns, and of the question whether any reason can be assigned for the positions in which the larger centres of population are found. The system of roads, canals, and railways, will also be briefly recapitulated. And if the question of the way in which the affairs of the county are managed has not already been referred to, some information may be given regarding it.

By some such grouping of subjects, but with endless modifications according to local requirements, a tolerably complete geographical picture of the county as a definite area of the earth's surface will be formed in the minds of the pupils. Taken in connection with their previous essay in the description of the parish, the completion of this picture will have given them some practice in geographical methods, and will form an excellent introduction to the study of geography. The teacher is now in a position to consider the most important step that his scholars have yet

taken in their geographical training. They have now to realise the relation borne by their own surroundings to the whole country. As before, this step must be taken deliberately upon a map, which ought to be a large clearly engraved wall-map of the country, not overloaded with details.

The first point to be fixed is the exact position of the school locality on the general map of the country. Probably the place itself, unless it be an important village, a town, or a city, will not be found upon the map at all. But the home county will be readily recognised, and the precise site of the school can easily be determined with the help of the larger or county map. This site ought then to be conspicuously indicated as the centre from which the knowledge of the rest of the country is to be ascertained.

The first use of such a general map of the country probably requires a greater mental effort on the part of young learners than we usually suspect. It affords, however, according to the method of instruction here advocated, another and excellent opportunity of training the sense of proportion in geography. The faculty of readily appreciating the relation between the map and the area it represents; of recognising the actual value of the distances expressed upon the map; of realising from the engraved lines of water-course what must be the general disposition of the ground, should be sedulously cultivated from the very commencement of the employment of general maps of countries. Towards the training of this capacity for making full use of a map, attention should be called to the representation of the home district upon the three scales of map which have now been employed. The parish containing perhaps an area of one or more square miles, will occupy a space of several square feet on a large plan. On the parish plans of the Ordnance Survey a single square mile takes up a square measuring rather more than twenty-five inches on the side. It is reduced to no more than one square inch on the county or one-inch map. But on the general map of the whole country, even though on as large a scale

as such wall-maps are ever made, the parish is no longer marked, and even the county is reduced to small dimensions. It is by thus training the eye to judge of relative scales from actually known areas, that experience is best acquired in the handling of maps. When the same area has in this way been compared on the different maps, the respective scales may, with advantage, be represented upon the board. A square mile on the scale of the parish plan may first be drawn, then the same space on the scale of the county map, and lastly the same space on the scale of the wall-map of the country. These may seem dry details, but they can be made sufficiently interesting in practice, and their importance in geographical training is such as to justify the expenditure of such amount of time and labour as they may need for their thorough comprehension. It is the want of this early training that lies at the root of the common inability to take advantage of the full value of maps. I would, therefore, urge that before further use is made of the general map of the country, attention should be specially concentrated upon the home county as represented on that map, and that the pupils should be freely exercised in contrasting it with the same area as shown on the large county map, noting the abundant details left out of the general map, and pausing to consider why such and such details have been selected to remain. In this way, the notion of generalisation in the representation of geographical facts will gradually be impressed upon the mind.

Another preliminary advice may here be offered. The idea should be constantly kept in remembrance that the map affords a basis for personal observation and reflection on the part of the young learners. Nothing in the least of the nature of a task to be mechanically committed to memory is yet to be assigned to them. They are to be encouraged and helped to use their own eyes in making out what the map is fitted to reveal to them. A few suggestions as to the line to be pursued will suffice to set them on the track, and with little help they will follow up any

hints that are given to them. Thus a spirit, as it were, of original observation and discovery may be fostered even in the first essays in the use of maps.

The site of the home county having been recognised, its boundaries should first be retraced on the general map of the country. Its position with reference to the surrounding counties will then be seen, and any important facts in its relations to these counties will be noted. If, for instance, several lines of highway or of railroad converge without meeting in the home county, the meaning of the convergence will be at once understood, when all these arteries of communication are seen to coalesce in some great town in an adjoining county. Every obvious example of this dependence of the home county upon the regions lying outside, may be advantageously brought to the notice of the pupils, as in this way they will be the better enabled to connect their own environment with the geography of the country and of the whole globe. In pursuance of this method, it will be found of much service to observe on the map the courses of any streams which run across the county. These streams should, on the one hand, be followed upward to their sources, and downward to their mouths, and then the basin of drainage in which the county lies should be made out by tracing its watershed as defined by the heads of the streams that flow in opposite directions. A simple outline of the physical geography of rivers, supplementing and enlarging the information already acquired, may here be usefully given, taking the streams of the county as the text of the lesson. Or if the pupils show sufficient aptitude in the use of the map, they may be required to trace out the watershed of the whole country, naming the principal rivers that flow from it on either side.

In like manner, the physical configuration of the home county should, where practicable, be connected with that of the adjoining counties, and generally of the country at large. If, for example, it includes part of a great plain, of a long valley or of a range of hills, the continuation of these features should be followed into the surrounding regions.

Thus, step by step, some idea will be obtained of the position of the county in the general topography of the whole country. At the same time, definite conceptions of the physical geography of valleys, plains, and hills, will be formed, and a foundation of knowledge will be laid, the value of which will be practically felt when the pupils enter the more advanced stage of geographical teaching.

A further use may be made of the general map of the country before the pupils quit the elementary stage. The more familiar geographical terms, such as cape, bay, isthmus, peninsula, watershed, river-basin, etc., having been explained and illustrated from examples on the map, one of the exercises on the map should consist in discovering further instances of each term. This way of arriving at the meaning of these words is infinitely preferable to the old-fashioned plan of learning the definitions by rote, at the very beginning of the instruction in geography, often with no reference to any map for illustrations, and with but little comprehension of what was learnt. The teacher who has not had experience of these two contrasted methods of instruction, can hardly realise the extent of the advantage he gains by inciting the children to explore the map for themselves, and to discover as many illustrations as they can find of each term with which they make acquaintance.

When the broad features of the country and the meaning of the more frequent geographical terms have been mastered by an attentive examination of the wall-map, there remains only the final step in the elementary stage of tuition, which is to pass outward from the country and realise its position upon the surface of the earth. At the end of Chapter VI. I have alluded to the way in which the idea of the shape of the earth is to be impressed upon the minds of the learners. It is at the present stage of their training that this can most conveniently be accomplished. They have gradually had their ideas of geographical space extended from their own immediate surroundings, and are now prepared to realise the conception of the size and form of the whole planet. The simpler kinds of proof of the

globular shape of the earth will be given, and the lesson will be illustrated from the school-globe, which must now be brought into constant use. Having grasped the notion that they are living on a huge ball, the scholars will next be asked to find out upon the globe the position of their own country. Some little time should be spent in comparing the representation of the country there with that shown on the large wall-map already used. The outlines will be found to be still more generalised, and a crowd of details and names that occupied a place on the wall-map can no longer find room on the much smaller delineation of the country upon the globe. The lesson that was enforced in passing from the large parish plan to the county map and from the county map to the general wall-map of the country, may now again be dwelt upon in advancing from the wall-map to the globe. And thus, by a continuous chain of illustration, the minds of the learners are led upward and outward from their school surroundings to realise the shape and dimensions of the earth.

It is not desirable at this stage of education to enter into detail regarding the surface of the earth as a whole. Enough is gained when the idea of the planet's shape and size is firmly implanted in the minds of the learners. But if attention has not been called to the subject before, a good opportunity is now presented of referring to the spherical form of the sun and of the moon, and so, step by step, to the conception of the solar system. By help of diagrams and apparatus this may be made intelligible, and it always excites interest and wonder. Much good may be done by actual inspection of the sky on clear nights. The moon, seen through an ordinary telescope or opera-glass, is an impressive object, and if the glass is powerful enough to reveal the form of the craters, and to show the peaks standing out of the dark shadows and catching the light of sunrise or sunset, it will be a source of infinite pleasure alike to teacher and pupils. The principal constellations should be pointed out, and especially the Great Bear and the Pole Star. The motion of the starry heavens

round the celestial pole should be watched and measured, and the rate of movement should be compared with that of the sun across the sky during the day. These star-gazings cannot, of course, always be carried out. But where they are impossible, the want of them should be compensated by descriptions of what the pupils will see for themselves if they look. By help of a diagram on the board, for instance, they can easily be taught to recognise the Great Bear, and from it to find the Pole Star. Even as they lie in bed with the window-curtains drawn, they may watch the steady movement of the stars across the heavens. Prominent and fundamental facts of this kind, which can be readily perceived, and the perception of which excites the imaginative and reflective powers, ought, by all means, to be brought to the notice of the young.

In bringing to a close my remarks on the elementary stage of geographical teaching, let me allude to one great advantage which the method of instruction here advocated seems to me to possess. In too many cases, the education of the young never advances much beyond the elementary stage. If the geography lessons have consisted of mere pages of definitions and statistics mechanically learnt by rote, they are pretty sure to be soon in great part forgotten, and they leave little or no permanent influence behind them. But if such a system as I have sketched in these chapters be followed, a lasting benefit cannot but remain on the minds and characters of the young learners, even though most of the facts that were familiar enough at school should eventually slip out of their memory. Trained to use their eyes, and to reflect upon what they observe, they start in the race of life with those faculties quickened that tell powerfully on success. They are furnished too with a source of perennial pleasure in that capacity for the perception and enjoyment of Nature which these early lessons will have fostered.

It is evident, however, that much of what they have learnt will not fade from their recollection but abide with them. It has been gained, not as a task for the memory,

but step by step, as a labour of love, wherein all the mental powers have been called into play. They will probably remember most of the great geographical facts and principles that have been brought to their notice at school. They will have formed some adequate conception of the relation of their own village or town to the whole country and to the earth at large. They will have been set on the right path for the acquisition of further knowledge, and even should their chances of learning more be of the feeblest, they will not begin the struggle of life wholly ignorant of what lies outside of their own daily surroundings.

CHAPTER XII

MORE ADVANCED GEOGRAPHICAL TEACHING—GENERAL OBSERVATIONS

In the foregoing chapters we have been engaged in considering that early part of geographical teaching which, beginning with the familiar objects of everyday experience, gradually enlarges the experience of the pupils until they gain a clear conception of the geography of their own neighbourhood, and an acquaintance with the meaning and use of a map. To this fundamental division I have given the name of Elementary Stage. All the subsequent course of instruction may for my present purpose be embraced in one great division, which I would call the Advanced Stage. There is, of course, no abrupt line to be drawn between these two sections of the curriculum. A pupil who has been well trained in the lower grade will pass without any sense of dislocation or sharp transition into the higher. The same leading principles of teaching will be maintained throughout. But certain broad distinctions may, nevertheless, be drawn between the work of the lower and higher forms. In the elementary stage, the home surroundings form the centre from which everything around is viewed, the starting-point from which the earliest experience of the world is gained. It is only at the very end of this stage that the attention of the scholars is directed outwards to the geography of a wider region than that of which they have personal acquaintance. No class-books are used, but ample occasion is found for enforcing habits of direct ob servation and reflection.

Fully to discuss advanced geographical education as it deserves would require an ample and exhaustive treatise. This it is no part of my present plan to attempt. What I wish to do is rather to show how the same guiding ideas may be pursued from the elementary into and through the advanced stage. The latter is broadly characterised by the use of class-books or readers, by the practice of written exercises and essays, and by greater precision, detail, and breadth in the manner of treatment. The method I propose to follow in dealing with this vast subject is to notice in succession each of its leading subdivisions, and to point out how the spirit and aim I have tried to enforce with regard to the earlier part of education may be continued in its more advanced progress. At the outset the following general considerations should be taken into account.

1. It is desirable to test the amount and quality of the knowledge possessed by the pupils before they enter upon this higher part of their instruction. Especially needful is it to see that they have gained an adequate conception of the meaning and use of a map. Until this acquirement has been satisfactorily made, they should be kept at the threshold, for otherwise every forward step they try to take will only involve them in greater difficulties, and make the task of teaching them the more disheartening.

2. Class-books or readers are now to be used. I have already in Chapter III. adverted to the requirements which such books should fulfil. Simplicity and clearness of language are absolutely essential in the earlier books. Those who write them, however, too seldom remember how limited is the vocabulary of poor children. It may not be possible, perhaps not even desirable, to write down to the level of the most ignorant class of children. But to err in that direction is a pardonable fault. Of course, by dispensing with books for the elementary stage, by accumulating in the minds of the pupils a large amount of general information, and by making them familiar with the meaning and use of a constantly-increasing number of words, we are able to start the first class-books on a much higher level of in-

telligence than if they had to be prepared for the merest beginners. And this is an enormous gain to the writers of the books as well as to those who have to use them.

3. The lessons must be more than ever based upon maps. Among the exercises prescribed should be such as will test the capacity of the pupils to make full use of maps. At the risk of tedious repetition, I would once more insist strongly upon this practice as an absolute essential for successful geographical teaching. Every variety of map should be successively introduced. Every subject that admits of treatment in that way should be illustrated by maps. The pupils are in this manner trained in geographical methods of representation, which express the facts to them with a breadth and clearness that are hardly otherwise attainable.

Map-drawing may be made a useful practice in teaching. It impresses neatness of hand, accuracy of representation, and familiarity with geographical details. But these desirable ends cannot be attained by mere mechanical copying. A boy, for instance, who makes his map by slavishly tracing it on thin paper at a window-pane had better be otherwise employed. Map-drawing ought not to be prescribed until some advance has been made in the comprehension of the projections of a sphere upon a plane surface. One of its most important elements is the fixing of latitudes and longitudes in the memory, and this should not be attempted until the conception of meridians and parallels has been mastered. A useful exercise is to plot the meridians and parallels, and to insert from memory the main features of the topography in their proper places.

4. The use of the school-globe should be constantly insisted on. By no other means can the form of the earth's surface, the shape and disposition of the oceans, continents, and islands, the course of the great marine and atmospheric currents, and the general physical geography of the whole planet be so effectively grasped. Many astronomical questions, involving a comprehension of the earth's position in space and its movements, may be made intelligible by means

of a globe with a tenth part of the labour that would otherwise be needed. In short, nothing can supply the want of a school-globe, and no teacher of geography should rest satisfied until he has obtained this simple but indispensable piece of apparatus. The "use of the globes" was formerly one of the accomplishments taught even in young ladies' boarding-schools. Owing, perhaps, to defects in the method of teaching, it fell into disrepute, and has for the last generation sunk into undeserved neglect.

5. Written exercises are now to form an important part of the work of the class. In the elementary stage, these were not required. While the scholars were being trained to observe and think, they were allowed to express themselves orally, in such language as might come naturally to their lips. But accuracy, conciseness, and clearness of expression, together with some proportion of literary grace, may now be demanded in written exercises. At first, however, this demand need not be very rigorous. The themes given out should be of the simplest nature, and should generally be such as involve on the part of the writers some little thought rather than transcription. Mere copying from a book may serve well enough by way of punishment, but should not form part of the normal work of the geography class, which ought on the contrary to be bright, intelligent, and with as little as may be of mechanical drudgery. As the pupils advance, essays on subjects discussed in the class-room will furnish good material for such exercises, while for the higher forms questions involving special research in prescribed works of reference may be assigned. To this part of the work I shall again revert in the final chapter.

6. It appears to me on every account desirable that the first subject to be treated of in the advanced stage, should be that which was just reached at the end of the elementary stage—the Fatherland. The advantages of thus binding the two grades of teaching together are obvious. At the same time, just as the school district formed the appropriate centre, from which the comprehension of the shire and of

the country was reached, so the country serves as the basis from which an acquaintance with other countries and with the whole earth is gained. The fatherland ought accordingly to be treated with considerable fulness of detail. It should be made to illustrate as far as possible, the great principles of physical geography, and the conditions embraced in political geography. On a groundwork of knowledge obtained in the study of their own country, the scholars will be ready to move forward to the consideration and comprehension of other regions of the globe, where physical and political details may be strikingly different.

7. While the ordinary work of the class-room will be based mainly on the class-book used, it will be found of advantage in the higher forms to take a wider range, and to read and criticise books of travel, voyages of discovery or special geographical papers. This may be done partly in school and partly at home, or as a holiday task. Such a subject for instance as Arctic discovery, or African exploration, or the history of our acquaintance with the interior of Australia having been prescribed, certain books of travel may be read and discussed in the class-room, others may be assigned for home reading, and finally an essay may be suggested, giving a summary or general idea of the whole subject. With this question also I shall deal more in detail in the concluding chapter. As already pointed out, the final task of the geography class may sometimes consist in a thorough geographical study of the school district, combining all or most of the branches of inquiry which have occupied the attention of the pupils, and affording them a practical illustration of the nature and value of geographical research.

8. The practice of making excursions should on no account be left off. Nature is practically limitless, and if the walks lie in a country district, they may continue all through the school curriculum, without exhausting the store of fresh interest and instruction which they opened out at the beginning of school-life. But, of course, there is a contrast between the simplicity and elementary character of

the subjects that commanded attention in the first excursions; and the minutiæ and detail, as well as the breadth of generalisation that mark the observations made in the later walks.

9. Much benefit will be gained by continuing and extending the lessons in surveying, which in the elementary stage were made the groundwork for the comprehension of a plan or map. Greater precision and detail will now be demanded, and the use of a few surveying instruments may be profitably taught. Beginning with the school itself a more accurate plan should be made than was possible with the rough measurements referred to in Chapter V. A base line should be measured along some level road, and a system of triangulation devised which will illustrate how geodetical surveys are carried out, as further referred to in the next chapter.

It will be understood that although, for the sake of methodical treatment, the following leading subdivisions of the subject are here discussed in logical sequence, they need not necessarily be taken in this order in school work. On the contrary, questions in mathematical geography which I take first will naturally be postponed until a comparatively late part of the school course. It will be found necessary also to consider many of the subjects together in reference to the region which exemplifies them. In dealing with the fatherland, for instance, illustrations of each of the subdivisions will naturally be sought out. My object is merely to offer some suggestions as to the way in which such illustrations are to be made.

CHAPTER XIII

MATHEMATICAL GEOGRAPHY

THIS important branch of the subject cannot be fully apprehended until towards the close of school-life. Treating the earth as a member of the solar system, it discusses its shape, size, density, motions, and the influence of these motions in such phenomena as day and night, the seasons, the changes of the atmosphere and the currents of the ocean. It determines the position of places on the earth's surface by astronomical observations, measures terrestrial distances and areas, and lays down rules by which adequate representations of the earth's surface may be made in globes and maps. Some portions of this wide subject may obviously be made sufficiently comprehensible in an early part of geographical education. The shape and size of the earth, and its movements of rotation and revolution can be presented in a fairly intelligible form to young scholars. Determinations of longitude and latitude require greater mental exertion. Questions of geographical projection demand still more training in mathematical processes. The whole subject ought, therefore, to be taught progressively in proportion to and simultaneously with the advance in other departments of geography.

The fundamental idea in mathematical geography is measurement. And though this measurement must be made accurately with instruments of scientific precision, the idea involved in it may nevertheless be practically inculcated, before the intricate processes of geodesy and astronomy are understood by the pupils. For this purpose,

a more correct and detailed survey of some part of the school neighbourhood affords an excellent illustration. At first, the instruments employed may be few and simple. A protractor of cardboard can be made by each pupil for himself. A convenient form is a half-circle graduated on the circular edge on both sides, the one side showing the points of the compass from N. by W. to S., and the other from N. by E. to S. The straight side, divided into fractions of an inch, serves as a scale for the reduction of rough measurements, such as pacing, to paper. A simple pocket-compass will serve for the earlier lessons; but it should be shown that with a watch marking correct time, the directions may be obtained with approximate accuracy from the sun's position. The teacher should try to have a prismatic compass provided as part of the school apparatus, so that he may lead his pupils onward to a practical acquaintance with the principles of triangulation. These are all the instruments essential for laying such a basis of knowledge as will enable boys to make really creditable local surveys, and will fit them for understanding how by processes of accurate geodetical research, maps and charts of the earth's surface are constructed.

It is desirable that every boy and girl should have some definite conception of how a map is made. In the elementary stage of instruction, some general notions of the subject will have been acquired. But more precise and accurate ideas are needed than could then be comprehended, and these can be gained without any great effort on the part either of teacher or taught. The early lessons have already shown the value of neatness of hand in the delineation of topography, and have made the pupils acquainted with some of the conventional forms of representation. These lessons ought to be extended. The manner in which topographical features are drawn upon maps should be fully illustrated on the blackboard, and the drawings there made should be copied on their slates or on paper by the pupils. Roads, houses, villages, trees, brooks, rivers, lakes, railways, cliffs, hills, quarries, and so on are to be depicted boldly and

neatly in the usual conventional patterns, and the class is to be exercised in representing them from memory until a sufficient stock of practical knowledge of this kind has been acquired.

Then the use of protractor and compass will be explained in the class-room, and a beginning will be made in applying them to the task of actually making a measured survey, and representing the ground to scale upon paper. A suitable straight base-line must first be selected, such as a stretch of straight road with, if possible, some conspicuous object at or near each end of the line. One end is the starting-point and the other the second station. Rectangular pieces of stiff cardboard of any convenient size are better than paper for field work. Their size will, of course, depend upon the area to be represented and the scale employed. The earlier trials should not be on too small a scale. The scale of the large parish plans of the Ordnance Survey, viz. 25·3 inches to a mile or $\frac{1}{2500}$ of Nature, may be recommended, with the advantage in many cases of having these plans with which to compare and test the work done by the scholars. As confidence is gained, a scale of 6 inches to the mile or $\frac{1}{10560}$ of Nature will be found large enough.

Having chosen the base-line, the teacher will direct each pupil to fix his card on some convenient rest. A low wall or post will suffice, unless a little tripod stand be carried out for the purpose. The card should in general be so placed that each of its margins faces one of the four cardinal points, the top being to the north. The direction of the meridian-line for correctly placing the cards may be determined with a watch and the shadow cast by the sun, with a common pocket-compass or with the prismatic compass. The starting-point being marked on the card, a line is to be drawn in pencil from that point in the direction of the base-line. This may be done by looking along the surface of the card to the second station. The length of the base-line, or the distance from the starting-point to the second station, will then be measured by pacing, or with tape or

chain, and by referring to the scale on the protractor the required number of feet or yards can be marked off upon the card, and the second station is then inserted. From each station, by looking along the surface of the card, a number of faint pencil lines may be drawn in the direction of conspicuous objects, which are to be embraced in the survey. If this is done with some care, the point of intersection of the lines from two stations to any given object will assign the position of that object on the card. By a series of cross-bearings from the different stations selected, a system of triangles will be constructed, and the position of the main features of the ground will be obtained. The intermediate details may then be sketched in by the eye or drawn from actual measurement. This, of course, is a very rough and simple style of surveying, but it has the merit of being easily apprehended by pupils of average ability, whom it initiates in elementary ideas of triangulation. After a few lessons in the class-room, and one or two trials in the field, they may make creditable maps of the neighbourhood. But as they advance it will be desirable to let them take their bearings with a prismatic compass, measure the angles of their different triangles, and plot these carefully with the protractor. Before the subject is ended, information may usefully be given regarding some of the great geodetical surveys of the earth's surface. Our own Ordnance Survey and the great trigonometrical Survey of India supply excellent materials for illustration.[1]

Great differences will be noticed among the pupils in deftness of hand at field work. Neatness and cleanness of map-drawing should be strongly inculcated. Fine pencil lines can be replaced by inked lines at home, and the rough symbols employed for brevity in the field should be carefully exchanged with the pen for the ordinary conventional patterns which they were meant to represent. For some purposes, coloured chalk pencils are of great convenience, each colour being used for some particular kind of object

[1] See Colonel White's interesting little volume *The Ordnance Survey of the United Kingdom* (1886), W. Blackwood and Sons.

or pattern, and thus saving more lengthened notes or signs.

When, after a few lessons, the pupils have learned how to work, a part of the district may be portioned off into small sections and distributed among them. One or two boys may be assigned to each section and map it out. The various sections are then to be put together into a connected map. This is a useful exercise, as it brings out very clearly the discrepancies and agreements in the work of the different young geographers.[1]

As an illustration of the practical application of the method of triangulation, a map showing the system of primary triangulation for the detailed survey of a country is of much interest. The original base-line, carefully and accurately measured, and then the complex series of triangles observed with such accuracy of measurement that at the far end of them there may not be an error of more than an inch or two, show to what a degree of perfection geodetic surveys can now be carried.

In connection with these lessons in map-making, information may usefully be given regarding various means of rapidly obtaining approximate measurements that are often wanted in everyday life. Walking along the bank of a river we may wish to know its breadth; or skirting the base of a cliff or mountain we may long to know its height. The principle of a measured base-line and triangulation from each end of that line should be shown to be easily applicable in such cases. The method of measuring heights by their shadows should also be explained.

From the survey of small districts, the attention of the pupils will next be led to the methods employed for delineating with accuracy large areas of the earth's surface. The nature of latitude and longitude, to which reference will already have been made in the elementary stage, must

[1] Some excellent examples of such maps were exhibited at the Royal Geographical Society's recent Exhibition of Geographical Apparatus by my friend and former student Mr. F. Grant Ogilvie, now Principal of the Heriot-Watt College at Edinburgh.

now be more fully considered. Some practical illustrations of the subject are of great service, such, for example, as taking the latitude of the school. Having mastered the conception of lines of latitude and longitude as expressed upon the school globe, the pupils should be further instructed in the methods of determining the latitudes and longitudes of places, and in such problems as the measurement of a degree of the meridian, together with the proofs which by this kind of measurement have been obtained of the spheroidal form of the earth, and of the amount of the polar depression. It is on every account desirable that all the earlier work connected with questions of latitude and longitude should be worked out with the globe, before any attempt is made to deal with parallels and meridians upon maps.

The representation of a small part of the earth's surface upon paper involves no practical difficulty. But, as the area increases in size, the difficulty arises of expressing the external features of a sphere upon a flat surface of paper. This problem leads to an examination of the various systems of projections. A good series of diagrams illustrative of the more usual and important projections should be obtained or made by the teacher himself. When the principle involved in each has been explained, the outlines of the countries shown in the projection should be compared with the correct proportions depicted on the globe, that the eye may be enabled to realise the amount and effect of the distortion. As an exercise, the parallels and meridians, as expressed in a few of the projections, should be carefully drawn by the pupils, and afterwards the outlines of the countries may be filled in from memory. Practice of this kind is the best way of accustoming the eye to the correct appreciation of relative proportions and distances upon maps.

CHAPTER XIV

THE PHYSICAL GEOGRAPHY OF A REGION

HAVING discussed general principles and methods of teaching in my *Primer* and *Class-book of Physical Geography*, I wish here to make some suggestions as to their practical application in dealing with the geography of the various countries and continents of the globe. It may be laid down as a fundamental doctrine in education that in the discussion of the geography of a region, natural features should be considered before political conditions. The topography, rocks, soils, climate, and productions form the environment that has surrounded the human race from the beginning, and in a thousand different ways has influenced its progress. These natural features ought, therefore, to be dwelt upon at the outset, with especial reference to any obvious effect they may have had upon human history and development.

This indispensable and, when rightly viewed, most interesting department of geography is, for the most part, only feebly and inadequately treated of in school-books. The information there given often consists of little more than can be readily enough found on any ordinary map. And even some of the fundamental facts which the map exemplifies are omitted. Now, as I have already insisted, a good school-book of geography should aim at supplementing the details given in the map, not at merely repeating them. The map must be the groundwork of the teaching, and what it can be made to exhibit to the learner need not be scheduled in detail in a class-book. To a large extent, the teacher must obtain his materials from fuller sources of

information than the ordinary school-books. What he has to aim at is that his pupils shall form a definite mental picture of the physical geography of a region as the best preparation for the intelligent appreciation of its political arrangements.

Now, at the very threshold of this department of instruction, lies the necessity of first realising clearly and fully the position of any region upon the earth's surface. This can only be satisfactorily accomplished by the use of the school-globe. The pupils should make themselves thoroughly familiar with the relative place of the country with regard to land and sea and the nature of its surroundings. Then will come the consideration of its position with reference to the equator and pole. When these subjects are well understood it becomes much easier to comprehend questions of climate, and to follow the comparisons that may be made between the country and other regions of the earth. Attention should early be given to the true form and orientation of a country. This is best done when the idea of longitude and latitude has been mastered. The map or globe should then be studied with reference to the parallels and meridians. After repeated exercises on this matter, the pupils may be asked to set down from memory the lines of latitude and longitude, and to insert the outlines of the country with the positions of some of the chief places. This is a much more testing and effective kind of map-drawing than the servile copying so much in vogue. That training of this kind at school is required will be readily understood, if in any company of educated people questions are asked as to the relative positions even of well-known places. We need go no farther than our own islands for illustrations. What proportion of ordinary members of society could tell correctly if asked whether Inverness or Liverpool lay farther to the west, or if Bristol stood east or west of the meridian of Edinburgh? We should probably find that in the great majority of cases the answer would unhesitatingly be, that as Edinburgh and Inverness are on the east coast they must lie east of Liver-

pool and Bristol which are on the west coast. An inspection of any map would correct this blunder. Inverness, though built on the margin of the North Sea, really lies about 70 miles west of the meridian of Bristol and nearly on that of Plymouth. Edinburgh lies about 10 miles west of the meridian of Liverpool. These erroneous notions become so firmly fixed in one's memory and habits of thought that it is hardly possible in the end to eradicate them. Their existence, however, occasions many misconceptions which are sometimes sufficiently serious in the practical affairs of life. I would, therefore, urge the importance of making sure that the general form and position of a country on the globe are adequately comprehended at the very outset.

For many purposes of comparison, the superficial area of a country is a datum that may with advantage be fixed in the memory. It should be legibly inscribed upon the margin of the map, both in the measures used in the country, and in the equivalent value in English square miles. The metrical system is now in such general use that the amount of the area may also be stated in square kilometres. It is not desirable to burden the memory with mere figures, but the statement of the actual extent of surface of a country may at once be connected with so many interesting particulars that it does not need to be remembered as a mere isolated and independent fact. To show its value some illustration of its usefulness may be given; as, for instance, the method of comparing the relative density of population by dividing the total number of inhabitants by the area, and thereby obtaining the proportion of inhabitants to every square mile of surface.

In dealing with topographical features, the teacher ought, for his own sake as well as that of his pupils, to make himself master of the general geological structure of the country on which he is about to give lessons. The surface of the land, in all its varieties of form, depends so intimately upon the nature and grouping of the rocks which compose its framework, that until the character and lie of these rocks

have been learnt no adequate conception of the topography can be formed. It is not necessary, nor indeed always desirable, to give geological structure a foremost consideration in the actual lessons in school. This subject may be reserved until a later part of the instruction. But if the teacher makes himself acquainted with it for his own information, he gains such an insight into the meaning of the topography and the dependence of its several parts upon each other, that he is able to arrange the subject in a far clearer and simpler form for his pupils than would otherwise be possible. Every one who has taught geography must have experienced the difficulty in presenting the physical features of a region in such a way as to afford a clear and definite, as well as accurate notion of them to young minds. It is indeed one of the great difficulties of geographical teaching, which no method or system can entirely remove. The most effectual way of coping with it is for the teacher to get at the key to the whole subject by studying the geological structure, and learning, for example, why there are mountains here and plains there, why one hill differs from another in form, why lakes abound in one region and are absent in another, why scenery changes from district to district. The answers to these and many similar questions can be obtained with more or less precision from geological evidence, and they impart a thoroughness and breadth to the teacher's knowledge, which even though they are themselves kept in the background give great effectiveness to his lessons.

In regard, therefore, to the teacher's own preparation for his task I would urge him to study a geological map and sections of a region before he begins to deal with its topography in the work of his school. Experience will soon lead him to recognise how far this study should be pursued for his immediate purpose. Mere geological details, how interesting soever they may be in themselves, need not detain him unless they help to give him a more definite conception of the causes that have produced the topography. Thus it is a matter of comparatively little moment that he

should be able to follow the intricacies and refinements of petrographical nomenclature. Whether the rock that forms the core of a mountain-range is to be called granite or syenite, gneiss or mica-schist, greenstone or diorite, is a question that he may leave to the pedants who wrangle over such momentous trifles. Enough for his object to see that it is a solid, durable, crystalline mass, well fitted to tower above the rest and to contend with the fierce tempests and piercing frosts that carve and fret these lofty summits.

It is well worth while to consider those essential differences of geological constitution that give their peculiar characters to the various types of scenery. The remarkable contrast, for instance, between the forms of the Eastern and Western Alps is at once intelligible when we look below the surface and learn out of what entirely diverse materials these two portions of the great chain are composed. Or to take instances on a smaller scale, let any one examine a set of drawings or photographs of the hills and dales of central Yorkshire, Carnarvonshire, Peeblesshire, Perthshire, western Sutherland, northern Skye, Sligo, and Leitrim. Each of these districts presents a striking individuality of scenery. The hills may be of similar mass and height, but they are strangely diverse in their outlines, colours, and details of form. Such differences as these, insignificant as they might be thought, have not been without a profound influence upon the historical development of the people, and on this account alone, deserve the special attention of the geographer. Thus the limitations of the successive races that have inhabited the country have been largely determined by the local peculiarities of the surface. The rugged contours, deep glens, numerous lakes and morasses, and impenetrable forests of the Highlands, for example, gave to that region the character of a natural fastness wherein the Celtic race, elsewhere driven away or swallowed up by the Teutonic immigrants who took possession of the more fertile lowlands, could maintain itself with but little intermixture for centuries, and follow its wild life of war and the chase. The

mountainous tracts of the southern counties of Scotland, on the other hand, though once haunted also by a Celtic people, were long ago embraced within the area of the Teutonic invaders. Their gentle undulations and smooth slopes presented no sufficient barrier to the progress of the stronger race, and when their forests were cut down, the carpet of verdure that spread over them marked them out as the great district of sheep-farmers and cattle-breeders which they have since become.

One further and very characteristic illustration of the same kind of influence on the landscapes of this country may here suffice. On any good map of England that shows the position of the higher grounds, a tolerably continuous line of hills may be traced from the coast of Devonshire to that of Norfolk. A continuation of the same range may likewise be followed from the north side of the Wash through the eastern parts of the counties of Lincoln and York. We can readily see that such a long belt of uplands running right athwart the island must have had a notable effect on the advancement of the inhabitants. But no ordinary map reveals the cause and nature of this effect. The hills rise from the plains on their north-western side with a steep face which, projecting into headlands and retiring into bays, recalls a long line of sea-cliff. The cornfields and woodlands stretch up to the base of these hills; but on the declivities and far and wide over the summits the surface is for the most part treeless, and sweeps onward in endless undulations carpeted with short green sward. Where the hills reach the sea, they end off in picturesque white cliffy promontories. At the southern end, Beer Head looks out across the mouth of the English Channel, while at the northern extremity, Flamborough Head towers above the waves of the North Sea. The same characters of scenery are displayed by two long arms which the main belt of hills throws off from the plateau of Salisbury Plain. One of these stretches eastward in the range of the North Downs, keeps a little south of London, and advances to the Strait of Dover, where it terminates in the well-known

range of white cliffs. The other branch bends slightly southward, and ends in the white promontory of Beachy Head.

These lines of heights are dominant features in the topography of the south-eastern half of England. They affected the settlement and progress of the various tribes that have peopled the region. They have in large measure determined the boundaries of parishes and even the sites of villages and towns; while in more recent years they have had a potent influence upon the spread of farming, grazing and the cultivation of trees and fruit. But it is not until we turn to a geological map that the meaning and source of this influence can be properly understood. We there learn that these remarkable ranges of bare hills are formed by the outcrop of the Chalk; that the area occupied by that rock at the surface exactly defines the limits of its influence; that in "the long backs of the bushless downs" we see the characteristic form of surface into which the outcrop of the Chalk weathers, and that the white cliffs with which the hills everywhere project into the sea are promontories of chalk.

In entering with his pupils upon the consideration of the physical configuration of a country, the teacher's aim must be to get at the dominant features, and to show how all the rest of the topography is dependent upon these. Where a mountain-chain exists, it will naturally form the first subject of inquiry. And here the assistance to be derived from a comparison of the ordinary map with a geological one is most marked. In some cases, a mountain-chain consists essentially of one main band of heights. In others, two or more such bands run parallel with each other, and there may likewise be successive parallel ridges flanking the range and gradually decreasing in altitude as they recede from it. This is more particularly the arrangement in mountain-chains of the first magnitude. In Europe, for example, we have the magnificent ranges of the Alps, flanked by the long parallel narrow ridges of the Jura. Now this structure can be made out more or less easily in any good

topographical map of Switzerland. But after having tried to puzzle it out there, let the inquirer turn to a good geological map of the same region (such as that of Studer and Escher) and he will not fail to be struck with the clear light he there finds thrown upon the question. He at once perceives the essential parts of the structure of the mountain-chain due to the vast plications of the earth's crust. He sees which are the true arms or offshoots from the main chain, and why they run in the lines they have taken. The meaning of the remarkable southerly trend of the ridges at the western end of the chain, and their south-eastward prolongation through the Maritime Alps into the chain of the Apennines is readily understood from any good geological map of Europe.

Where no line of mountains serves as the back-bone of a country, it is useful to begin by tracing the axis of the region as defined by the line of watershed. This the pupils can easily do for themselves. Their attention, however, should be called in some detail to the nature of the watershed, particularly in regard to its variations in altitude. The common error of supposing that the watershed is always the highest ground of a country may not improbably have arisen from the pernicious custom of our map-makers in engraving a line of mountains along the line separating the flow of streams in opposite directions. A useful way of guarding against the perpetuation of this error is to make the pupils trace out the watershed of Europe. They will thus learn that by far the largest part of the "great divide" of the continent runs over low grounds.

Where the data are obtainable, a section on a true scale should be drawn on the blackboard across the country whose physical geography is to be studied. The importance of keeping the proportions between height and breadth true to nature in such sections can hardly be over-estimated. An accurate conception is thereby afforded at the very outset regarding the true proportions of the vertical to the horizontal distances. In some instances, the axis is nearly central; but for the most part it lies to one side.

Hence there is usually a shorter and steeper slope on that side, and a longer and gentler one on the other. The importance of this feature in the topography is at once seen when the question of the drainage comes to be considered.

Hill ranges and isolated hills or groups of hills, though possibly unimportant in the physical structure of the whole region, have often great local significance and deserve attention. Here again reference to the geological map will explain the reason of the position of these eminences arising from the character of their component rocks and overlying soils, and will thus throw light on the nature of the influence they may have had in the progress of the people of the country. The limestone escarpments and clay flats that mark the outcrops of the different members of the Oolites of England supply many admirable examples. In central Scotland, the isolated crags of eruptive rock served as sites for forts or castles in early times, and round these defensive works towns have sometimes grown up, as in the cases of Edinburgh, Stirling, and Dumbarton.

In dealing with the valley systems of a country, the teacher will often find it practicable to adopt the useful classification into longitudinal and transverse. If he cares to investigate their origin, he will find that the longitudinal valleys are in general those whose course has been mainly determined by the action of water along the folds into which the crust of the earth has been thrown. The transverse valleys are for the most part those formed by the erosion of streams running down opposite slopes, and chiefly independent of geological structure. But even if he does not enter upon the problem of their origin, the possibility of such a simple classification is a great help to him in teaching. In the Alps, for instance, the long central depression in which the Rhine and Rhone flow in opposite directions, is a magnificent instance of a longitudinal valley, while the numerous streams that descend from the Bernese Oberland into the plains of Switzerland flow in transverse valleys. It frequently happens that the two systems

coalesce. The valley of the Rhone, for example, turns sharply round at Martigny, and from longitudinal becomes transverse. There are many cases also where it is hardly possible to say to which series a valley or a certain portion of it should be referred. Such a blending of the two directions is perfectly intelligible if we consider how erosion would tell upon a mass of ground which, though upheaved in one or more long ridges, would necessarily present endless diversities of surface to modify the initial operations of running water. Had the land been elevated into parallel smooth ridges, like house-roofs laid side by side, we may suppose that the direction of the valleys eroded down the declivities would have remained tolerably distinct from that of those which, running along the bottom of the converging declivities, received their waters. This sharp contrast, however, is seldom reached in Nature. It is better preserved among the Jura Mountains than in the Alps. But if the teacher carries with him the idea of one set of long valleys which run parallel with the axis of the country, and of another set placed transversely to these, he has an intelligible principle of arrangement, with the help of which he may make the valley system of many parts of the globe easily comprehensible.

Though the mountains are the main determining topographical features of a region, the plains are of most importance in political geography, and deserve, therefore, that their topography should be carefully considered. Now here, again, the value of a geological map as an aid to the teacher will at once be evident. The existence of a plain in any particular region, the character of its surface, the position of its watershed and slopes, and the nature of its soils are as fully determined by geological causes as the site and structure of a mountain-chain. Viewed in the broadest way, the plains of the earth's surface may be regarded as areas over which the detritus worn away from the surrounding hills has been spread out. Sometimes the deposition of material has taken place under the sea and the sea-floor has afterwards been upraised into land. In other

cases, the various torrents, brooks, and rivers descending from the uplands and sweeping down continual burdens of gravel, sand and silt, have strewn these materials over the lower grounds and gradually levelled them out into wide plains. Admirable illustrations of both these types of low-land are to be found on the European continent. The great plain of Northern Germany is an instance of a tract of land which was recently in great part under the sea-level, as is shown by the occurrence of marine shells of living species in the superficial sands and clays. The plain of Lombardy, on the other hand, encircled by the great chains of the Alps and the Apennines, has for ages received the detritus continuously swept down from these heights by innumerable streams. Not only have the plains been gradually heightened but they have been pushed out to sea. So rapid is the gain of land that Ravenna, originally built in a lagoon like Venice, is now 4 miles from the sea, and the port of Adria, so well known in ancient times as to have given its name to the Adriatic, is now 14 miles inland, while on other parts of that coast-line the breadth of land gained within the last 1800 years has been as much as 20 miles. On a small scale, the same result is visible in every mountainous region, for there the plains are generally confined to the spaces between the bases of opposite slopes, and are due to the descent and deposition of sediment swept down from the heights on either hand. Thus, without entering far into the domain of geology, the pupils may gain a tolerably clear conception of the meaning of plains, and why they lie where we find them.

The question of drainage opens up a most interesting section of the physical geography of a country. In arranging the treatment of it, the teacher will naturally connect it with what has already been learnt regarding the configuration of the surface. From the main watershed, he will pass to a comparison of the number and relative size and length of the streams on the two sides of the axis. It is useful to compare, where possible, the angle of declivity on the two sides, which may be obtained by dividing the

height of the sources or of the watershed by the horizontal distance to the mouth of the river or the limit of the country. A stream rising at a height of 3000 feet and flowing a distance of 50 miles to the sea would have an average slope of 60 feet to the mile,—a comparatively steep declivity, which would make the stream a rapid one. But the declivity is never uniform, being far higher in the mountainous than in the lowland portions. It may be represented by a parabolic curve, of which the directrix is a vertical line parallel to the axis of the mountain-chain.

An important fact in drainage is the area of the river-basins. For most of the large rivers of the globe, this has been ascertained with some approximation to the truth, while for those of the British Islands it has been more accurately determined. It is one of the necessary data for a comparison of the relative volume and work of rivers.

Another interesting subject connected with drainage is the influence which the circulation of water over the country has had upon the human population. The existence of springs, for example, has in innumerable cases determined the original sites of farm settlements, which have grown into villages, and sometimes into towns. The growth of London and of the surrounding villages now absorbed into that vast mass of streets, has been chiefly determined by the position of a superficial layer of gravel which has supplied water to the population. The river valleys were the natural highways by which the primitive population made their way through a country. Along these tracts were found the most abundant supplies of water, and often, also, the flattest and most fertile land. It was natural, therefore, that the early settlements should have been planted on the courses of the rivers. A convenient ford would form an obvious site for the gathering together of population, and for the ultimate growth of a town. We have only to cast our eyes over the map of any country to see how constantly important towns and cities have sprung into existence at the point where a river could be crossed by some main line of road. The meeting-point of two

rivers was likewise a favourable situation for the foundation of a town community, which could command the resources of two lines of valley. Coblenz, for example, perpetuates in its very name the admirable geographical position which made the Romans select it for their town *Confluentes*, at the meeting of the waters of the Rhine and Moselle.

In treating of the climate of a country, the teacher will often be at a loss for his materials, as these have only in recent years begun to be systematically collected, and are not yet to be found in convenient and readily accessible form. For his purpose, the main facts to be ascertained are the mean atmospheric pressure in January and in July, the mean summer and winter temperature, the mean annual rainfall and its distribution in the different seasons, the prevalent winds and their relation to rainfall, the general character of the weather, and the direction and peculiarities of the storms. If he can obtain access to published weather-charts, they will give him in ample detail all the information he requires. Most civilised countries have now established meteorological stations, and publish the observations made thereat. The weather-charts of this country and the United States are good examples of the scientific and practical advantages of such observations. The *Times* and other newspapers publish daily charts of the weather, from which much valuable information may be gathered. But the teacher will do well to procure some of the daily weather-charts issued by the Meteorological Office, and as specially illustrative of their use, he should select those published a few days before and after a great storm. The dominant influence of barometric pressure upon the atmospheric movements, the relation of the velocity of the wind to the barometric gradient, the paths of storms across the country, the conditions of temperature and moisture that precede, accompany, and follow the atmospheric disturbances, are all told with singular clearness in these documents. Without troubling the younger scholars with meteorological technicalities, which they may not be able to follow, the teacher will

have little difficulty in making them clearly understand the broad outlines of the law of storms, and the dependence of the prevalent winds of a country upon the position of the neighbouring regions of high and low atmospheric pressure.

Of the method in which the natural history of a country should be dealt with I need say little more than has been already advanced in Chapter IX. It is not the business of the teacher of geography to give instruction in botany and zoology. But plants and animals form so important an element in the geographical conditions of every part of the globe, that at least their geographical aspects must be considered by him. I would, therefore, recommend him to make himself acquainted with the main facts regarding the geographical distribution of plants and animals. The great provinces or regions of the earth's surface, characterised by peculiar assemblages of living things, admit of thorough geographical treatment, and the books on this subject, cited on pp. 47, 48, will be found storehouses of information. The flora and fauna of a country ought evidently to be considered not merely by themselves, but as belonging to one of these provinces, and partaking more or less of its characteristics.

But there is the further consideration that many of the products of the animal, vegetable, and mineral kingdoms, are of the utmost commercial importance. They supply food, raiment, fuel, and the materials for trade and commerce. This aspect of them will of course be kept prominently in view in dealing with the natural productions of a country. Much may be done to make this part of the teaching effective by the reduction of the details to geographical expression upon maps. For example, one map may be constructed to show the distribution of the cereals, pasture-lands, forests, orchards, vineyards, or other plant cultivation of a country. Another may be made to show the tracts reserved for game and wild animals, for cattle-raising, dairy produce, and sheep-rearing. A third will represent the distribution of the mineral resources. As a rule, such maps are not to be purchased, but with

the help of the printed returns, to which access can without much difficulty be had, each teacher may construct them for his own country at least.

The natural history of mankind must find a place in geographical teaching. The broad characteristics of the great families of the human race are easily comprehended, and the distribution of these families over the surface of the earth is represented on maps that can be had everywhere. The chief languages, and the areas over which they are spoken, can also be illustrated by maps which, if the teacher has linguistic tastes, may be made both interesting and profitable to the pupils. The religions and degrees of civilisation of the different peoples may likewise be graphically shown upon maps.

CHAPTER XV

THE POLITICAL AND HISTORICAL GEOGRAPHY OF A COUNTRY

I CANNOT attempt to do more than offer a mere outline of the plan of treatment which seems to me best fitted to bring this wide subject within the grasp of pupils of average ability. Many of the fundamental conceptions in political geography will have been already mastered by them in the elementary stage, in so far as these may have been exemplified in the school district. The knowledge to be subsequently acquired is better obtained from concrete examples than enunciated in abstract definitions. Not until some progress has been made, should the subject be treated in a generalised way. For example, forms of government, or the relations of colonies to their mother country, are better understood and more intelligibly classified, after various examples of different types of the subject have been considered.

In pursuance of this idea of proceeding from the concrete to the abstract, from the known and familiar to the less known and foreign, the treatment of political geography should begin with the present condition of things. Only after what now exists has been examined and understood, should an attempt be made to ascertain what has been, and to trace out the gradual development of the present geographical conditions of a country.

In beginning the consideration of the political geography of a nation, an early question to be considered is who are the people that inhabit the land, and in what respects are

they marked out as a distinct community of men. Now the three essential factors in the individuality of a people are race, language, and history. At the outset, therefore, some information must be given regarding the race of mankind to which the people belongs, and any particular modification or mixture of race which it may exhibit. It is not needful to enter into the refinements of modern ethnography; the broad facts of the case can generally be put in plain words and made readily intelligible. Among the potent influences that have helped to mould national character are the circumstances of the environments. Attention will, therefore, be directed to any obvious relation between the physical features which have been already considered, and the temperament and political or industrial progress of the people.

The subject of language offers considerably greater difficulty. As regards the non-Aryan tongues, no more can probably be attempted by the teacher than the mere statement of the name of the language, the area over which it is spoken, the tribes that use it, the degree of civilisation with which it is associated, and whether or not it possesses a literature. But the Indo-European languages are capable of fuller illustration. Their fundamental unity of type, and at the same time their wide diversity from each other, can be exemplified by giving in different languages the word for some familiar object, or some expression of everyday use. Interesting information may be imparted by this means regarding the kinship of the modern Romance tongues, Italian, Spanish, Portuguese, and French, and their connection with that of ancient Rome; the affinities of English, Dutch, German, Flemish, Danish, Norwegian, Swedish, and Icelandic may in like manner be illustrated. Tracing such close linguistic relationships serves to impress certain broad geographical facts upon the memory. A knowledge of languages, and an acquaintance with the meaning and gradual changes and corruptions of words are of the utmost value in geographical inquiry, as I shall have occasion to mention again later in this chapter.

Coming to the country itself, its present political boundaries and subdivisions will be followed upon the map, together with the towns and cities. This part of the work is usually treated in considerable detail in school-books, and need not be further dwelt upon here. I need only repeat that mere strings of names to be got by heart from printed lists are to be shunned in teaching. The names should be learnt from the map, whence each ought to carry with it in the memory a definite geographical position. In no department of his work are the personal qualifications of the teacher more tested than in this. As far as possible, every name should be linked with some association which will not only serve to fix it in the recollection, but will connect it with some wider interest than its mere place upon the map. But no school-book can supply any adequate measure of such associations, or can offer more than the briefest allusion to those which it cites. The teacher must himself supply the deficiency. From popular tradition, from general literature, from history, biography, and poetry, from antiquarian chronicles, from the records of science and of art, from the pages even of dry and repulsive blue books he may glean the illustrations that will brighten and vivify the lessons.

I pass rapidly over the other subjects which may, with more or less propriety, claim a place in geographical teaching; the form of government of the country; internal administration; police organisation; ecclesiastical condition; educational arrangements; army and navy; internal communications, including roads, canals, and railways; postal system; coinage and money, trade and industries; commerce by land and sea; revenue, expenditure, and debt; colonial possessions. On some of these subjects which may not have been touched upon before, a little preliminary general information may require to be imparted. And use should be made of the map, in every case where it can be applied. With regard to railways, for instance, the main trunk lines should be traced on the map, and then one or two of the more important systems may be followed into

its numerous branches. The chief railway companies publish with their time-tables large maps of the country showing their railway system and its connections. These maps are most useful for teaching purposes, as the whole of a complex railway system is printed in a bold legible way, and standing out clear above the topography catches the eye at once. As the time-tables are sold by the companies for a penny per copy, the expenditure of a few pence will furnish a school with a series of small but effective diagrams of the railway systems of the country.

I turn now to the historical side of political geography, of which some fuller consideration seems here desirable. Few observant teachers will refuse to confess that this part of geographical instruction is generally in this country either neglected altogether at school, or is treated in the most meagre and perfunctory way. Why it should have sunk into this unfortunate position among us need not here be discussed. But the result is often ludicrously manifest in the crude notions and ignorant assumptions which so often do duty for knowledge in this matter. The present political limits of a state are too often supposed to have the same kind of stability as if they had been boundaries fixed by Nature. When France of the fifteenth century is spoken of, what proportion of readers has any notion of the difference between what was called France then and what is France now? Yet surely history cannot be intelligently understood unless such distinctions as this are kept in view. Nor, on the other hand, can any one be said to have made himself properly acquainted with the geography of a country, unless he has learnt how its present political limits came to be fixed where they are, and how the people and its institutions have reached their present state of development. Geography and history are thus inseparably interwoven, and neither is fully comprehensible without the other.

Hence when the existing geographical limits and aspects of a country have been considered in such detail as the state of advancement of the pupils may warrant, attention should be directed backward to former times before the

present conditions had been established. But just as it was not needful to teach botany and zoology in order to equip the geography class with sufficient knowledge of natural history for geographical purposes, so it is not necessary to trespass far into the domain of history to gain such an acquaintance with historical facts as will make clear, at least in outline, the progress of the geographical development of a nation. It will often happen indeed that the historical information is already possessed by the pupils. They may have learned what has been the general march of events, but they have probably not seen these events treated geographically and depicted in graphic form upon maps. At all events, such an outline of the history of a nation may be appropriately given to a geography class as will suffice to show through what successive stages the present political limits and subdivisions of the country have been reached.

The simplest and most effective way of bringing forward this historical outline is by a well-devised series of maps, each of which represents the geography of the country at a well-defined epoch. In using these maps, it is best to work backwards from the modern state of things, each stage showing a further departure, until perhaps in the earliest no trace whatever can be found of the existing subdivisions or limits. The gradual evolution of what is now the United Kingdom of Great Britain and Ireland furnishes admirable material for this method of treatment. How this material may be made use of in maps may be seen in Mr. Freeman's *Historical Europe*, Mr. Pearson's *Historical Maps of England*, Mr. Green's *Making of England*, or in the *Hand-atlas* of Spruner-Mencke. The fluctuations in the geography of France are likewise capable of furnishing excellent examples of the value of the geographical method of treatment.

From the map depicting the earliest known historical condition of the country, attention will naturally pass to the race or races which then inhabited the country. What is authentically known about them from historical docu-

ments will, of course, be stated, as well as any further information which may be obtainable from archæological inquiry. Here, again, the British Islands supply singularly interesting materials. When the light of history first breaks upon the country, we find its southern portions in the occupation of a people called the Britons, akin to the Celts of Gaul. As the light increases, we recognise another tribe in the north, to which the Roman invaders gave the name of Caledonians. That there were differences of race among the natives of Britain during the early Roman occupation was recognised by the observant Romans themselves. Tacitus particularly notices the small, dark, curly-haired tribe of the Silures, who lived in what is now Wales, and whom he sagaciously compares to the Iberians of Spain. He remarks that, on the other hand, the Britons of the south-east of the country were like the Gauls, who lived opposite to them, while the big-boned, red-haired Caledonians of the north recalled the characteristic features of the Germans.

When we pass from historical evidence to the testimony of language, we recognise at least two early races in Britain, both belonging to the great Celtic family, the British, Welsh, or Cymric, and the Gaelic or Erse. The language of each of these races is still spoken in the country by the descendants of those who spoke it in the days of the Cæsars. But each is now restricted to certain parts of the islands,—the British to Wales, and the Gaelic to the Scottish Highlands and Ireland. That they were once spoken far and wide over the country where now English only is heard, is not recorded merely in history or preserved in tradition. The names of hundreds of places and natural features over the whole length and breadth of the English-speaking part of the land are Celtic. During all the centuries that have passed away since the Celtic tongues ceased to be spoken there, and in spite of wave after wave of Teutonic immigrants, these names have remained uneffaced. Specially persistent are the names of conspicuous landmarks, such as rivers and hills. The Celts were happy in their selection

of epithets, which usually had reference to characteristic features of the objects to which they were applied. Hence these ancient names preserve a record both of the migrations and language of the people, and also in many instances of the particular aspect which struck their imagination in hill, river, or valley. Thus we have the white river (Allan), the black river (Douglas), the rough river (Girvan). The Celtic topographical names all over the country offer abundant materials for most interesting inquiry.

From the relative positions now occupied by the Welsh and Gaels, we may infer that the Gaels came first into Britain. This inference is confirmed by a study of the topographical nomenclature. But there was still an earlier race than the Celtic. From the sepulchral barrows the bones of a small-statured people have been disinterred, whose oval skulls marked them off from the round-skulled and big-boned Celts, whom they certainly preceded as inhabitants of the country. This race has been with some confidence identified with the Iberian. The swarthy Silurians referred to by Tacitus were thus in all probability descendants of the earlier natives of the land before the first wave of Celtic invaders arrived. They seem to have mingled with their conquerors, whose language they eventually adopted, but to this day the short dark type of Welshman probably retains much of the aspect of the primitive race. This pre-Celtic people is represented in modern times by the Basques of the Western Pyrenees and by the Lapps and Finns of the north. That it once spread far over Europe, and that it was driven away or incorporated by the advancing Celts is indicated not only by neolithic remains but by topographical names, which survive as memorials of the Iberian aborigines. These names contain roots referable to none of the Aryan tongues but which can still be recognised in the languages spoken by the Basques and Finns. Among them are *ura*, water (Uria, Astura, Liguria); *asta*, a rock (Asta, Astorga, Asturia, Astobiza); the termination *etani* (Aquitania, Lusitania, Mauretania, Britannia), and the initial syllables *al*, *ner*, *sal*,

tu (Alava, Alagon, Aliava, Nerac, Nersac, Salamanca, Saldana, Salor, Tua, Tudela, Tulle, Turis).[1]

Topographical names furnish an ample field for study in relation to geographical inquiry, and may be made the subject of special attention in the more advanced forms of a school.[2] They are capable of furnishing information regarding (1) geological changes that have been witnessed by man, but of which no historical record may have been preserved; (2) former aspects of a country which must have been effaced many centuries ago; (3) early ethnological migrations; (4) events and personages mentioned in history, or of whom no other memorial may have survived.

1. A large list might be collected of local names, which prove that since they were applied, the land has gained largely from the sea. Thus on the delta of the Rhone in the Mediterranean, the names of places lying along the road from Nismes to Béziers, are said to be all of Celtic origin, such as Nismes itself, which anciently was Nemausus, a Latinised form of the Celtic *nemet*, a sacred grove. These names, it is to be presumed, were given before the Romans conquered the country. But after the conquest a dialect of Latin gradually became the language of the people, and all the places south of that line of road are of Latin origin, such as Aigues-Mortes (Aquæ Mortuæ), Franquevaux (Franca Vallis), Frontignan (Frons Stagni). The inference has, therefore, naturally been drawn that the Celtic road ran along what was then the shore-line, and

[1] Taylor's *Words and Places*, chap. ix.

[2] Serious blunders in etymological explanations have often been made by not attending to the earliest known form of a word, which is sometimes quite unlike its modern corruption, and suggests a totally different derivation. Mr. Skene has insisted strongly on this point, and has called attention to the mistakes of well-known writers who have neglected the precaution. He gives as an illustration of his meaning the various forms which the word Traver (Treabhar, meaning probably a naked side of land) has assumed; Travernent, now Tranent; Traverquair, now Traquair; Traverbrun, now Trabroun; Travereglys, now Terregles; Travertrold, now Trailtrow; Traverflat, now Trailflat; Traverlen, now Crailing. *Celtic Scotland*, p. 215 note.

that after the arrival of the Romans, the silt and sand brought down by the river grew up into new land, which, by degrees, became habitable. The same kind of change is still in progress. Further additions to the coast have been made since Roman times, and French topographical names are to be found in advance of the Latin ones. Other instances may be cited from the British Islands, such as the Celtic *inches* or islands, on the Carse of Gowrie (Megginch, Inchyra), which were probably islets at high water before the last elevation of the land. Nor is the gain of land, thus topographically indicated, confined merely to the sea-margin. On the delta of the Rhone, in the lake of Geneva, the village of Port Vallais, which, as its name denotes, was once a harbour, is now half a league from the edge of the lake.

2. Among the memorials of changes in the landscapes of a country, reference may be made to the way in which the disappearance of forests is betokened by the survival of local names. The Gaelic word *Coille*, the Welsh *Coed*, the German *Wald*, the old English *Weald* or *Wold*, the Anglo-Saxon *Hyrst* and *Holt*, all signifying wood or forest, may be found scattered across the land. They serve to mark places whence the wood has been cleared for many a long century. Even the process of clearance is sometimes recorded by the local names, such, for instance, as many words ending in *field* or *feld*, which mark where the *felling* of the trees opened up spaces for homesteads; and others ending in *royd* or *rode*, which show where the wood was got *rid* of. The former existence of lakes, marshes, and mosses, is indicated by names in which the words mere, moor, moss, bog, morfa, rhos, cathar, and others occur.

3. The migrations of the great races that have peopled Europe can still in some measure be traced by the topographical names they have left behind them. I have referred to some of the linguistic relics of the short oval-headed Iberian or Euskarian people, who preceded the Celts, but who appear to have been themselves preceded

by a low, stooping monkey-like race. Much more abundant and recognisable are the names left by the immigrations of the Celtic tribes. Rivers and hills being among the most prominent landmarks, have more especially retained the epithets applied to them by these people. The Celtic words for "water" or "river" are still in use all over Europe in the names of well-known rivers. The Welsh *Afon*, and Gaelic *Abhuinn*, have remained unchanged in the numerous Avons of England and Scotland. The same word reappears in Italy (Avenza, Savone, Aufente) and in France (where the frequent river-names ending in *on*, *one*, *onne*, *ogne*, are probably corruptions of it). The Welsh *dur* is found abundantly over Britain and on the continent of Europe, from the Douro in the west across France, Switzerland, Italy, and Germany, into Austria. The Welsh *Wysg*, and Gaelic *Uisge*, water (best known in the word whisky, *uisge beatha*, *eau de vie*, "water of life") remains in the Usks, and Esks, and Ouses, that flow in the British Isles, and is recognisable in various corrupt forms (ax, ex, ox, etc.), both in this country, and over a large part of the Continent.

Again the Welsh word *Pen*, or the Gaelic *Ben*, a hill or mountain, is not confined to the districts where these languages are now spoken, but may be found far and wide over the Teutonic parts of Britain, and across Europe to the Pennine Alps, and the Apennines. The Celtic *duns* or forts formed the centres round which many modern towns have grown, and the names of which are still preserved in the topography (London, Dundee, Dunbar, Dumfries, Dumbarton).

Long after the Celtic races had reached the western limits of Europe, the wave of Roman conquest rolled into Britain. Its track has been well preserved by local names. Even towards its utmost bounds, where it arrived latest and remained for the briefest, it has left its indelible memorials in the "casters," "chesters," "cesters," and "streets" that remain in the current speech of the people, even up to the line of the Roman wall. Still later came the inundation of

Arab conquerors into south-western Europe, who have in like manner left their record in the topographical nomenclature. In Spain and Portugal Arabian names are crowded all over the map. The word *wadi*, for instance, which is familiar to us as the epithet applied by the Arabs to valleys in the East, is retained in such names as Guadalquivir (Wadi-l-Kebîr, the great valley or river), Guadalaviar, Guadalupe, and many more.

4. Among the local names that hand down the memorials of early times, none are more interesting or more frequent than those that commemorate events or personages, of whom, in the vast majority of cases, no other chronicle remains. Sites of battles, of forays, of murders have handed down from generation to generation the name that records the event, but of the event itself all other memory has vanished. The place where a wandering missionary built his rude cell among our wild ancestors still goes by his name, though not a stone of the structure may have survived, and though no one in the district may know aught of the saint himself. Such are scores of *Kils* scattered all over the districts formerly occupied by a Gaelic-speaking people (Kildonan, Kilbride, Kilkerran, Kilmarnock). Even the lonely desert place whither the saint retired to meditate, still perpetuates the memory of his solitary devotions. Thus the modern town of Dysart, on the coast of Fife, busy with the hum of hundreds of artizans and the clanking of steam-engines, takes its name from the sea-cave which was the retreat or *desertum* in which St. Serf in early Christian times, retiring from the rough Picts among whom he ministered, had a memorable discussion with the devil.

The names given by voyagers to the places discovered by them are full of interest in reference to the actual progress of discovery. Not only are the language and nationality of the voyagers recorded therein, but we recognise their piety and their affection for home in the repetition of home names. We see who were their contemporary rulers or patrons, and are sometimes reminded of the very day of the week on which a particular island was first sighted.

Even the names of streets and squares in a town may be made to yield up their testimony as to changes in topography, and to the gradual process by which the town has grown.[1]

[1] On the connection between geography and topographical nomenclature, reference should be made to Taylor's *Words and Places*, to which the author has been largely indebted. The reader who wishes to pursue the difficult subject of Celtic topography must study Mr. Skene's *Celtic Scotland*. Regarding the topography of towns, information will doubtless be supplied in the series of *Historic Towns* to be issued by Messrs. Longman.

CHAPTER XVI

SPECIAL GEOGRAPHICAL WORK OF THE HIGHER FORMS

THOUGH it forms no part of the plan of the present volume to discuss the more advanced stages of geographical teaching, a concluding chapter may, perhaps, not without advantage, be devoted to some of the special work of the higher forms. According to the method of instruction which I have recommended, the pupils will be led forward to more and more detailed and specialised treatment of the geography of each country or continent. While class-books serve as the basis of the lessons, their statements should be increasingly supplemented and expanded, not only by the teacher, but by the industry of the pupils themselves. This will be more particularly the case in those departments of knowledge where the information afforded by the class-books is more conspicuously deficient. For example, no class-books at present in existence supply any adequate treatment of man's environment in the different countries which he inhabits over the surface of the globe. I have tried to show, in previous chapters, how this deficiency may be supplied as regards the younger pupils. The more advanced scholars, however, require from the teacher a much wider range of reading and thought. The best recent maps are essential for his purpose, and to these he may usefully add such descriptions as from time to time appear of the less known regions. The Royal Geographical Society's *Journal* and Petermann's *Mittheilungen*, for instance, will be found indispensable aids, if he wishes to keep himself and his work abreast of the onward progress of our knowledge of

the earth's surface. He should likewise make himself acquainted with the more important additions that are continually being made to our acquaintance with the geological structure of each great region of the globe. It is hardly needful to repeat that he is not called upon to become a geologist, nor to keep pace with the infinite diversity of geological fact, continually being added to the sum of already acquired knowledge. He should, however, make himself master of the general principles of geology, and of so much of the details of the science as will enable him to seize at once upon those new discoveries that help to explain the meaning and origin of the physical features of countries. If he is so situated as to be able to glance over new geological maps, he ought on no account to neglect this advantage.

Again, the impetus given in recent years to the study of meteorology still continues. Every year increases our knowledge of meteorological fact, and strengthens and widens our grasp of meteorological law. The influence of climate upon human development being so profound, whatever helps to give us clearer ideas of the causes that determine the nature and variations of the climate of a country, deserves our careful attention. The various national observatories over the world are compiling a mass of data from which already important results have been gained, and which, when ultimately co-ordinated and discussed, will assuredly throw new light upon the atmospheric conditions of all parts of the earth's surface.

Nor will the diligent teacher omit a fuller treatment of the natural productions of the environment, and of their relation to the development and progress of human industry. This is a department of instruction where, in addition to the great facts which are familiar and persistent, constant modifications and additions require to be made, to keep pace with the alterations determined by the discoveries of science, political vicissitudes, changes of taste, transference of the areas of production, and other causes. In the British Islands, for instance, copper-mining, which still

stands in the ordinary class-books as one of the great sources of the wealth of the country, has become practically extinct owing to the discoveries of copper-ores in Spain, Chili, North America, and Australia. Our tin-trade which, from the days of the ancient Phœnicians, has made Britain the great tin-mart of the world, is in like manner in danger of falling away from us, owing to the abundance of the ores obtained from the East Indies, Australia, Tasmania, and now from Dakotah. Farming, and especially the cultivation of wheat, have been so seriously affected by the importation of cheap grain, that thousands and thousands of acres of fertile land in Britain, once in constant cultivation, are now lying fallow. The growing of wheat has, in large measure, given place to the rearing of cattle. Other industries are affected by depression of trade, and by bad seasons as well as by foreign competition. Hop-picking in Kent is now so unprofitable that the trade seems likely soon to disappear from among the occupations of the country.

In these and similar cases, it is ridiculous to go on with the stereotyped phrases of the class-books which, though true enough years ago, are true no longer. The teacher should have his eyes and ears open to the vicissitudes of that struggle, not for supremacy, but for existence, through which our manufacturing and industrial interests are now passing. Much has been recently said and written on this subject, and the truth has at length been recognised that if Great Britain is to hold her own in the midst of this fierce rivalry it must be by better education. Those on whom the chief brunt of the fight must personally rest, employers and employed alike, need to be better trained for a contest in which their foreign competitors so often bear away the prize of higher education and readier capacity for adaptation, if not of greater intelligence. In this training, the geographical master may take a large and important share. But to do so efficiently, he must keep himself acquainted with the varying phases of the great international competition.

The current literature of the day supplies copious in-

formation on this subject. Of special value are the journals devoted to the collection or discussion of statistics. Mr. Keltie's *Statesman's Year-Book* will be found of great service. The *Board of Trade Journal*, issued monthly from Her Majesty's Stationery Office, may be frequently referred to with advantage. Many suggestive papers will also be met with in the *Journal* of the Statistical Society.

For the most advanced pupils, therefore, in a good secondary or higher class public school, it is desirable to get beyond the limitations of a class-book, and to enter on a wider and more independent method of study. There are two ways in which this important step in their geographical progress may be taken. In the first place, a geographical author may be chosen as a subject for reading and elucidation in the class-room; in the second place, some subject may be prescribed for investigation at home, either with a view to the discussion of it at school or as the basis of an essay.

1. Geographical literature abounds in works well suited for reading at school. Take, for example, the subject of African exploration. The early volumes of Bruce, Mungo Park, and Clapperton show us the first attempts to solve some of the great problems which only in recent years have been settled. The history of the exploration of a particular region may be profitably followed through the writings of the successive generations of travellers who have explored it, and the meagreness of the first sketches may be compared with the ample information now available. The story of the Nile, for instance, is one of the most instructive, and at the same time fascinating chapters of geography. From the early pages of Homer, Hesiod, and Herodotus, and the classical writers who so often refer to the river "*fontium qui celat origines*," it may be followed with rapt interest down to the time when the secrets of the hoary Nile were revealed by the enterprise of Speke, Grant, and Baker.

Again, Arctic discovery offers abundant material for profitable study. The story of the search for a north-west passage embraces another fascinating division of geographical discovery. From the times of Sebastian Cabot and

Frobisher down to our own day, no prouder records of human courage, endurance, persistence, and enterprise are to be found than in the narratives of the successive voyagers who have built up our knowledge of the frozen North.

Two obvious modes of procedure will suggest themselves to the consideration of the teacher, who will be led to follow now the one, now the other, according to the nature of the subject, and the ease with which he can obtain command of the necessary literature. On the one hand, he may pursue a given subject, taking up one after another, in chronological order, those portions of successive authors which will most effectively serve to bring before his pupils the growth of our knowledge regarding it. On the other hand, he may select a single author for study, especially one who may serve as a type or model of the geographical explorer. Such books, for example, as Marco Polo's *Voyages;* Darwin's *Journal of Researches;* Humboldt's *Personal Narrative;* Livingston's *Missionary Travels and Researches in South Africa* and his later works; Payer's *New Lands within the Arctic Circle*, and many more which might be cited, may be used as the basis of the geography lesson. As a rule, works of this kind are too expensive to admit of each member of the class possessing himself of a copy, though I hope the day is not far distant when a series of well-selected, carefully-edited, and accurately-printed reprints of geographical classics will be produced at such moderate cost as to be within reach of every secondary school and college in the country. But where more copies of a work cannot be obtained, two will be found enough for good practical work, one being used by the master and the other by the class. Such portions of the book as may be selected for the purpose should be read aloud by the pupils, whose attention it will be the teacher's part to keep directed to the geographical data supplied by the author. He will call upon them for such illustrations and explanations as their own reading and reflection will supply; point out where important new facts were first brought to light; criticise methods of observation and deduction, and indicate

where later research has modified the author's conclusions. In short, the book is to be the basis of a careful discussion of the geographical facts and problems which it describes or illustrates, advantage being always taken of the latest available information on the subject of which it treats, so that the progress of geographical inquiry may be adequately appreciated.

For this kind of class-work many of the papers that from time to time appear in the Geographical Society's *Journal* are well adapted. Some of the presidential addresses of that Society, in which the progress of geographical discovery during the year is sketched out, may likewise be advantageously used.

2. Besides what is done in higher geographical study in the class-room, much may be accomplished by well-directed reading at home, either as part of the work of the term or as a vacation exercise. Here, again, the same twofold method may be pursued. A particular author may be selected for careful study, or a subject may be prescribed which will demand the perusal of many authors. The progress of the pupils in this kind of pursuit may be tested either by written examination or by essays.

There is an endless variety of subjects which may be selected for home-reading. Let me briefly allude to a few of these by way of illustration. Care will, of course, be taken to choose those which will be most likely to ensure that the pupils shall actually themselves gather the facts, and marshal the conclusions to be drawn therefrom.

If the geography of the home-county has not already been worked out, as suggested in Chapter XI., it may be employed with great effect as a theme for a geographical essay. The greater experience and knowledge of the pupils will now qualify them for a much fuller and more accurate treatment of the subject than was possible in earlier years.

The influence of geographical conditions upon human progress is a topic of world-wide interest, and of which innumerable illustrations may be obtained from all parts

of the world. In the infancy of European development, for instance, we see why civilisation chiefly advanced along the borders of the great Mediterranean basin. The countries that projected most boldly into that basin, and were able to communicate easily with each other by sea, were those most advantageously placed for success in the competition of races. Greece, surrounded with islands and penetrated by arms of the sea far more than any other Mediterranean land, was the natural starting-place of European civilisation, the home of free thought and free speech, of municipal life and political organisation. But Italy, lying more in the centre of the basin and having readier access to the western, southern, and northern lands, was destined by nature to take the lead among the nations of the Mediterranean region. The commerce of Phœnicia, despite the enterprise of its merchants, could not in the end contend with that of Rome. Carthage too entered into her struggle with the Latin race, having all the natural advantages against her. Hence the ultimate distribution of power in the old world was not merely a question of the superior vigour and intelligence of the Roman people, but was decided in no small measure by fundamental geographical conditions.

Again, in later times the preponderating influence of France in Europe may be partly traced to its commanding position on the Atlantic and the Mediterranean. The situation of the Spanish peninsula too afforded its inhabitants ready access to both seas, and enabled them to take the lead for a time among the maritime nations of the world. But it isolated them from the rest of Europe, and prevented them from acquiring and retaining that European influence which France's more central position gave to her. The political vicissitudes of Germany have somewhat obscured the geographical relations of that part of the continent. Their central position ought to have given the Germans the chief place on the European mainland. For a time, indeed, they held that place, but neither geographical advantages nor unity of race sufficed to withstand the

political disintegration of successive centuries. Within the lifetime of the present generation, however, the disintegration has been checked. Germany is once more a united people, and has again taken among the states of Europe that supremacy which her central position entitles her to claim and retain.

It is obvious that these general statements may be worked out in detail and extended to other countries of Europe. The relations of the different nations to the extra-European parts of the world open up a further range of inquiry. Why some peoples have for centuries possessed colonies and others have never had any is a question that admits of an answer mainly geographical. The Greeks were the great colony-planters of antiquity, for reasons which the map of the Mediterranean makes sufficiently clear. But after the tide of colonial acquirement left the Mediterranean shores and flowed into far distant parts of the world, no mere Mediterranean power could compete with those which had planted themselves on the ocean. Italy, for example, never established any colonies. But even small countries which had the advantage of a good maritime position were able to share in the appropriation of the uttermost parts of the earth. Portugal, Holland, Denmark, and even Sweden have their colonial possessions. But the most striking example of the relation of advantageous geographical position to colonial development is, of course, that which the history of Britain supplies. The growth of our colonial empire is a wide subject by itself, but it may in large measure be traced backward to the peculiarly advantageous geographical conditions of the parent country,—the unique position of Britain in the very midst of the land hemisphere of the globe, its place about the middle of the western edge of the European plateau, commanding easily all that side of the continent, and its abundant natural harbours that formed such admirable havens for building and sheltering our navies, and training our seamen from childhood in seafaring ways.

The subject of topographical names to which allusion was made in the foregoing chapter may be pursued with much interest and profit. Beginning with the most recent surveying or exploring expeditions into new regions, and taking note of the names given by the officers and men to bays, headlands, or islands, we may follow the nomenclature backward to the times of the mediæval navigators whose Christianity and whose routes can be so well recognised by the names they give to the places they visited. From names, the date and origin of which are historically known, we can pass to that wide topographical nomenclature where, while all record of the giving of the names has disappeared, the names themselves remain as historical monuments of the people who gave them, and often also of the geographical aspects of the places to which they were applied.

In a former chapter, I have insisted on the necessity for enforcing the truth that geographical conditions are not permanent. They arise from a combination of causes which are liable to continual modification. Though the extent of change may hardly be perceptible during a single human lifetime, it may reach a serious amount in the course of a few generations. To collect information bearing on this question serves to impress it firmly on the memory. In the case of Britain, for example, a large amount of historical and geological evidence is available to show how greatly the aspect of the country has changed since man came to live in it. This evidence may be profitably collected from the various authorities through which it is scattered. In the waste of the coast-line along much of the eastern sea-board and the gain of land in a few other places, in the changes of river-mouths, in the disappearance of hundreds of lakes, in the draining and obliteration of fens and morasses, in the clearance of forests, in the extirpation of wild animals, in the progress of agriculture, in the making of roads, canals, and railways, in the development of the fields of mineral wealth, in the establishment of the great centres of industry and population, in the growth of villages, towns, and cities—we see some of the more striking muta-

tions which within historic times the geography of the country has undergone.

Some of the details of this wide subject offer ample scope for special treatment. Such questions as the following, for example, may be suggested: What is the difference between the distribution of population in Britain at the present time and a century ago, and how is the change to be accounted for? Describe a given river basin, and show any relation that can be traced between the position of its towns and determining geographical conditions. Where are the sheep-rearing districts of Britain, and why are they there? Describe the distribution of grain-cultivation in Britain, and trace the connection between this distribution and variations in climate and soil.

The historical side of geography presents an almost exhaustless field of investigation. Having shown how this department of inquiry may be illustrated in the case of Britain, the teacher has the whole of Europe before him for further discussion. Freeman's *Historical Geography of Europe* will supply him with materials for many lessons, and will suggest to him inquiries to be prescribed to his pupils.

While the claims of history upon geography are thus recognised, it is also possible to link together in school-work, geography and literature. As an illustration of how this may be done let me refer to the subject of rivers. From the earliest times men have dwelt by the banks of rivers, have drunk of their waters, bathed in them, voyaged on them. Rivers, next perhaps to the sun himself, have always been the most prominent feature in nature to the eyes of mankind. In mythology and legend, in poetry and prose, their influence is traceable all down the literary progress of the race. As an exercise for learners, either in geography or in literature, the tracing of this influence may be prescribed. The descriptions of, and allusions to the Nile and its peculiarities, to be found among the writers of antiquity, and the explanation of some of these references as afforded by modern research, will supply material for an

essay. The rivers of the *Iliad* and the *Æneid* and the epithets applied to them; the Tiber as depicted by the Latin poets; the features of rivers specially alluded to by Shakespeare, or to be culled from English poetry,—these and many more illustrations may be pursued through a wide range of literature. Still more definite would be the study of the full list of English and Irish, as well as foreign, rivers given by Spenser in the eleventh canto of the fourth book of *The Faërie Queene*, in the series of stanzas beginning with the lines—

> "And after him the famous rivers came
> Which doe the earth enrich and beautifie."

Many of the physical peculiarities of our rivers are happily sketched in these stanzas, which may thus serve as the groundwork for a lesson on English physical geography as well as in English literature. In a similar way, the descriptions given in Drayton's *Polyolbion* are of interest, as giving a picture of the geographical conditions and general aspect of many of our river-basins in the early part of the seventeenth century. Less tedious and more available for ordinary class use, is the well-known enumeration of English rivers given by Milton in his early poem *At a Vacation Exercise in the College*. This passage supplies an excellent theme for elucidation and comment. Each river has some characteristic epithet applied to it by the poet, the explanation of which involves an inquiry into physical peculiarities or legendary associations. An interesting essay or series of essays might be prescribed on this little list of rivers, in which opportunity might be taken to trace the geography of each of the streams, to describe the general aspect of the basins drained by them, to note the more memorable historical events linked with each of them, to give some account of the chief towns built along their banks, to cull from other English poets references to the same streams, and to show what special features have been singled out for poetical treatment.

Such suggestions as have here been offered might be indefinitely prolonged, for the field is almost boundless.

But I have already reached the limits which I had marked out for this little volume, and must draw my remarks to a close. Enough has probably been brought forward in this chapter to show the spirit and some of the directions in which, as it seems to me, higher geographical instruction should be carried on. The line to be pursued will largely depend upon the individual predilections of the teacher himself. In some cases the historical, in others the literary, in others the scientific aspect will be most congenial. It is well that insight into each of these sides of geography should be gained by the pupils. But above all, the instruction must be earnest and thorough. I come back once more to the idea expressed at the beginning of these chapters that in the higher stages as well as in the lower, the success of the teacher of geography depends upon his own firm grasp of his subject, upon the living interest he takes in it, and upon the sympathy which he can awaken in the minds and hearts of the young.

THE END

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